Indian Archaeology

1980-81 -A REVIEW



INDIAN ARCHAEOLOGY 1980-81
—A REVIEW

EDITED BY

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Director General

Archaeological Survey of India



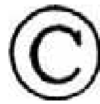
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PREFACE

This is the twenty-eighth issue of the *Review* containing report on archaeological activities in various fields including certain spheres of interdisciplinary researches. Thanks to the Physical Research Laboratory, Ahmadabad, and the Bhabha Atomic Research Centre, Bombay, we have now been able to introduce a sub-section on the thermoluminescence dating. I hope these institutions along with the Birbal Sahani Institute of Palaeobotany, Lucknow, will continue to devote their time and attention to the cause of archaeological research in India. It is a matter of great satisfaction that the Deccan College Post-graduate and Research Institute, Pune, has stepped forward for undertaking multidisciplinary archaeological investigations.

The manuscript for the *Review* for *1981-82* will shortly be sent to the press; it is hoped that the issue will be printed off by the end of this year. Much of the time in compilation can be saved if all the contributors follow the pattern systematized in the *Review* and use the spelling of place-names as given in the maps of Survey of India.

Apart from the items relating to the activities of Archaeological Survey which have been supplied by my colleagues in Headquarters, Circles and Branches, the material was received as usual from various State Governments, Universities and other research organizations. I am deeply beholden to all the contributors and apologize for any omissions and commissions that might have occurred.

I express my sincere appreciation of the cooperation I received from H. Sarkar, J. S. Nigam, K. P. Gupta, C. Dorje, S. R. Varma and Arundhati Banerji in the preparation and publication of the present *Review.* My thanks are also due to Messrs Naba Mudran Private Ltd., Calcutta for their close cooperation in printing this issue within a remarkable short time.

New Delhi
4 October, 1983

DEBALA MITRA

C ONTENTS

INDIAN ARCHAEOLOGY 1980-81

—A REVIEW

I. EXPLORATIONS AND EXCAVATIONS

ANDHRA PRADESH

1.EXPLORATION IN DISTRICT CUDDAPAH.—Two mounds were located near the village Tallapaka by the Registering Officer of the Department of Archaeology and Museums, Govern-ment of Andhra Pradesh. These mounds yielded pottery consisting of black and black-and-redwares, a lotus medallion and several brick structures.

2. EXCAVATION AT RAJAHMUNDRY, DISTRICT EAST GODAVARI.—In continuation of the last year's *(Indian Archaeology 1979-80—A Review,1* p. 1) work the Department of Archaeology and Museums, Government of Andhra Pradesh, resumed excavation with a view to expose more structures.

The excavation shows that the earliest settlement took place over a river-borne silt superimposed by a fine gravel deposit. A circular brick structure (brick size: 42 to 35 x 25 to 23 cm), with a diameter of 3.6 m internally and 85 cm in height, belonged to this phase. The finds include coarse red ware ascribable to *circa* sixth-seventh century AD. A square brick cella of 3.5 m side, with an antechamber (2.2 x 1.65 m), facing east, was exposed in the succeeding phase. Its floor was laid with two brick courses plastered with lime. This stratum may be ascribed to the thirteenth century AD. Contemporaneous with the cella are two brick walls, with an extant height of 1.1 m and 0.50 m. The average brick size is 30 x 20 cm. The pottery represents a grey ware. Excavation also revealed superimposition of the aforesaid cella by a badly-damaged stone structure. A number of stone balls along with a damaged cannon were found in association with the structure. The pottery of this phase consisted of medieval grey ware. The latest structural activity was represented by a brick built (size : 25 x 12 cm) channel intended to carry water lifted from the river Godavari. Besides grey ware, there were some fine porcelains bearing beautiful floral designs in different colour combination.

3. EXPLORATION IN DISTRICTS EAST GODAVARI AND PRAKASAM.—With a view to studying coastal and hinterland land-forms and to correlate the effects of sea-level changes with the Stone Age sites S. N. Rajaguru, R. S. Pappu, M. L. K. Murty, J. V. Prasad Rao of the Deccan College Post-graduate and Research Institute, Pune, B. K. Subrahamanyam, V. V. Madhusudan Rao and M. Kasturibai of the Nagarjuna University, Guntur, conducted explorations in Eleru and Paleru valleys. Their survey started from the hills of the Eastern Ghats on the west to the deltaic zones up to the river basins of the Godavari and the Krishna to the east.

Fairly thick (25 m) alluvial fills, representing two cut and fill episodes of the Eleru river, are preserved on the piedmont zone of the Eastern Ghats. These alluvial fills rest against the steep rock-cut slopes of the Khondalites. The top surface of the older fill occurs at an elevation of about 25 m above the modern bed level of the Eleru, while the younger fill terrace is inset into the older fill at an elevation of about 10 m above the bed level. The Upper Palaeolithic tools

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[1]The above-mentioned publication is referred to in the following pages by the year only.

occur in a stratified context in the gravel beds at an elevation of about 20 m in the older alluvial fill. On the other hand, Mesolithic and Neolithic occupations occur on the top of the older terrace (25 m).

These field observations show that the Eleru river has passed through at least two major phases of aggradation and degradation during the late Quaternary. The cliff section of the Older alluvial fill exposed on the left bank of the Eleru at Uppalapadu revealed interesting changes in the mode of sedimentation. Both cut and fill terraces and changes in the sedimentatary facies of the alluvial fills suggest that the region was affected by eustatic climatic changes. The deltaic plain of the lower Eleru did not reveal on the surface any field evidence of sea-level changes during the Late Quaternary.

On the other hand, the lower coastal plain of the Paleru further south, in the District Prakasam, revealed the following interesting geomorphic features. First, the occurrence of a pebbly gravel (fluvial) at a depth of 8 to 10 m below the present sea-level in a well-section at Kothapatnam suggests that the sea-level was lower by at least 10 m some time during the Quaternary. Second, the presence of a beach rock in another well at a depth of— 15 m further corroborates a lower sea-level during the Quaternary. Third, the examination of recently-dug well-sections in the area shows that the coastal plain is a product of gradually prograding deltaic plain of the Holocene Age. Fourth, about 15 km inland from the coast exposures of ferricreted cobbly gravels were observed between Singrayakonda and Ullapalem at a height of about 15-20 m above sea-level. These gravels rest unconformably on pre-Cambrains and they probably grade into the pebbly gravels observed in the well-sections near the coast. Present disconformable relationship between these two gravels indicate nco-tectonic movements in the coastal area. Fifth, between Kandkur and Kanigir at a place called Oguru, there is an extensive spread of cobbly, pebbly gravel which forms a conspicious landform in the form of a low hillock; a large number of Acheulian tools were collected from the surface of the gravel ridge, which is an anamolous geomorphic feature in the area and has no relationship with the present Paleru course. Further investigation of these fossil gravels in the coastal area of the Paleru valley will not only throw light on the neo-tectonic and glacio-eustatic changes of the Quaternary but may also help in correlating these features with the stratified Stone Age sites found in the upper reaches of the Paleru at Agraharam, Veligandla etc.

4.EXPLORATION IN DISTRICT GUNTUR.—The Department of Archaeology and Museums, Government of Andhra Pradesh, conducted exploration along the foothills at Gokinakonda andfound Middle Stone Age tools represented by cores, choppers, scrapers and flakes.Besides red ware, red-slipped ware, black-and-red ware and black ware belonging to early historical period were also encountered near the village. Megalithic burials of cairn-circle type were noticed on the slope of a hill near Pedamaddur.

5. EXCAVATION AT KOTILINGALA, DISTRICT KARIMNAGAR.—The Department of Archaeology and Museums, Government of Andhra Pradesh, carried out excavation near the river Godavari with a view to establishing cultural sequence of the site. The upper level revealed brick-built structures, platforms, drains and soakage pits. The excavation also brought to light beads made of semiprecious stones, terracotta figurines, iron objects and a few copper coins datable to the Satavahana period. The associated pottery is represented by red polished ware.

Excavation, which is in progress on another ancient mound near the range of hills, revealed the existence of a stupa with lime-plastered dome and projected *ayaka* platforms. A fragment of a *chhatra* (umbrella) contains an inscription, ascribable to the first century AD.

6. EXCAVATION AT NAGNOOR, DISTRICT KARIMNAGAR.—The Department of Archaeology and Museums, Government of Andhra Pradesh, carried out excavation at the site (said to have

contained four hundred temples) with a view to exposing the plan and elevation of the structures. The excavation revealed the remains of a temple representaed by a *garbha-griha* (2.57 x 2.50 m), and an *antarala* and other brick and stone structures. Antiquities recovered from the excavation include: beads of semiprecious stones, glass and terracotta; iron fragments; and a few bangle pieces.

7. EXPLORATION IN DISTRICT KRISHNA.—The Department of Archaeology and Museums, Government of Andhra Pradesh, discovered some Early Stone Age tools including cores and flakes from the foothills at Jaggayyapeta, the famous Buddhist site.

Further exploration at the hill slopes at Thirumalagiri yielded Middle Stone Age tools consisting of choppers, scrapers and cores.

8. EXPLORATION IN DISTRICT KURNOOL.—With a view to studying geomorphic and prehistoric investigations, R. S. Pappu and J. Vara Prasad Rao of the Deccan College Post-graduate and Research Institute, Pune, carried out explorations in the middle reaches of the Krishna river between villages Kudavelli and Vecrapuram in Nandikotkur Taluk.

Quaternary formations in this region are of fluvial origin and are represented by high level gravels and alluvial fills made up of gravel silts exclusively confined to the present day channels. High level gravels have extensive distribution and are found exposed on both the banks of the river Krishna. These gravels occur as cappings on the eroded limestones at an elevation of about 20 m above the present bed and about 0.50 to 0.75 km away from the present channel. These have attained a thickness of about 1 to 1-5 m. Good exposures of the gravel beds were observed also at Aralapadu, Jatpole, Kudavelli, Muravakonda and Patkondapur. Gravels are loosely consolidated and are made up of boulders, cobbles, pebbles and sands of chert, chalcedony, quartz, agate, quartzite and limestone. The gravel as a whole is rich in silica family minerals. The tools of the Middle Palaeolithic industry are found in abundance on the eroded surface of the gravel and also are confined to the top 30 to 40 cm of the gravel while the rest of the deposit is culturally sterile. The tool-kit using silica family minerals as raw material consists of varied and numerous forms of scrapers, points and borers. The high level gravel represents the abandoned channel of the ancient Krishna and is thus the earliest depositional phase. Middle Palaeolithic man arrived in the valley probably at the end of this aggradational phase.

An Acheulian site was located at Muravkonda at a distance of about 0.30 to 0.50 km away from the high level gravels. This site is situated at an elevation of about 20-22 m from the present bed. Tools, both in finished and unfinished stages in association with flakes, cores and chips, are found scattered on the eroded limestone. This surface site may represent open-air occupation-cum-factory site. The tool-kit consists of handaxes, the raw material employed for preparing artefacts being mainly quartzite.

A Neolithic site was located at an elevation of 10 m from the present bed near Muravkonda village. The habitational deposit (0.50 to 0.75 m thick) resting on the yellowish sub-recent silt yielded polished axes, rubber-stones, querns, mullers, a few potsherds and animal bones.

9. EXCAVATION AT RAMAPURAM, DISTRICT KURNOOL.—The Excavations Branch (1) of the Archaeological Survey of India,[1] Nagpur, under the direction of B. Narasimhiah assisted by B. P. Bopardikar, S. K. Lekhwani, D. K. Ambastha, S. K. Mittra, K. Ismail, Mohinder Singh, S. V. Sutaone, P. M. Bhope, K. M. Girhe, R. K. Dwivedi, R. K. Roy, M. U. Qureshi,

1The Archaeological Survey of India is referred to in the following pages as the 'Survey'.

Pyare Singh, B. K. Rudra and A. U. Ganar, conducted excavation at Ramapuram (Lat. 1505' N, Long. 78°05' E) with the view: (i) to establishing the cultural sequence and (ii) to understanding the settlement pattern and characteristic features of the chalcolithic culture in the region, besides imparting field-training to the students of the School of Archaeology. Kxcnvation revealed 85 to 95 cm thick cultural deposit belonging to a single culture which is divisible into three phases termed as Phases A, B and C (fig. 1).

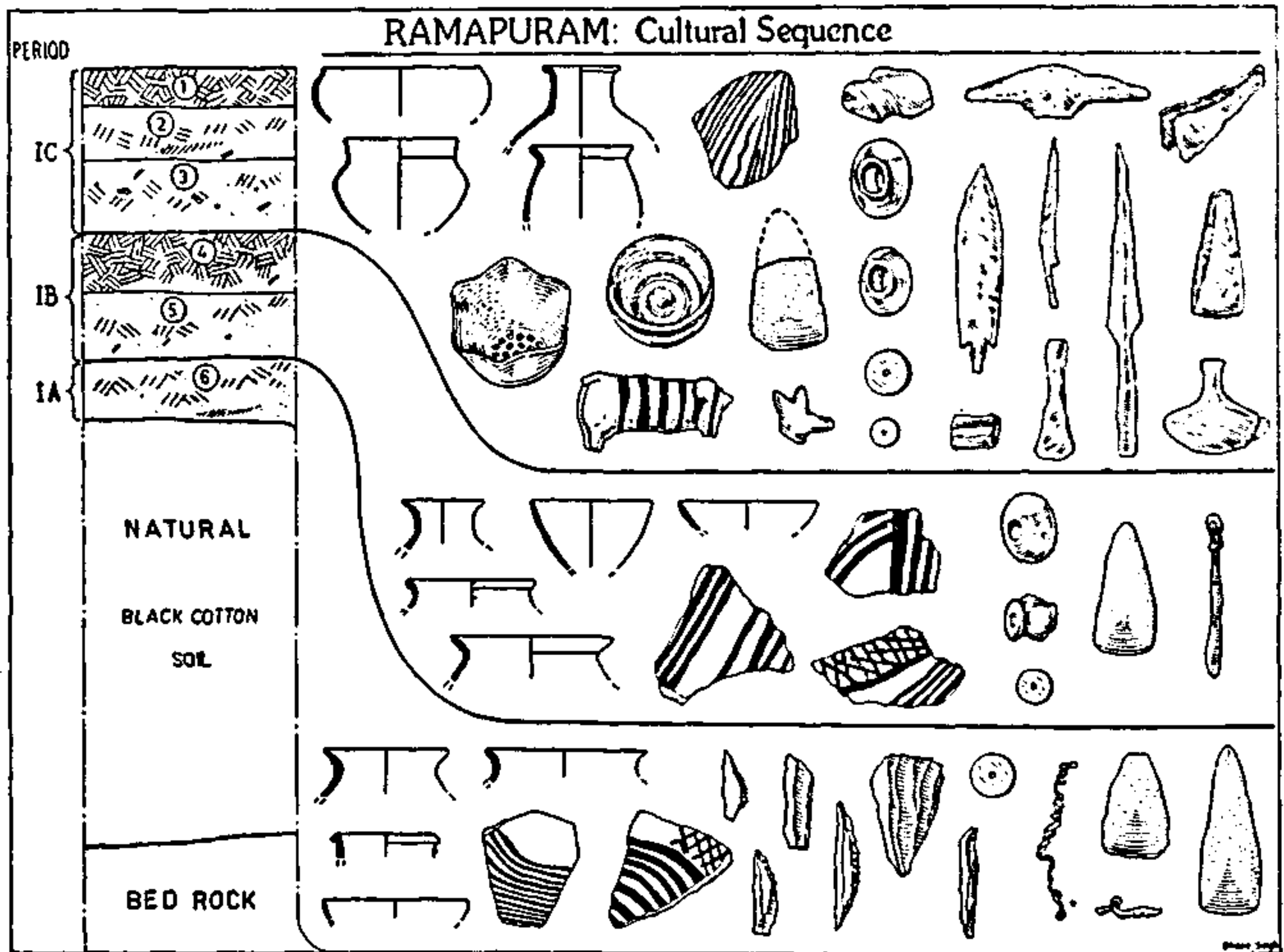


FIG. 1

Period I A is characterized by the occurrence of handmade burnished red, grey and black wares associated with microlithic tool industry and pecked and ground stone industry. Some of the vases representing all the three wares are treated with self-slip and burnished. However, vases in red ware of the latter variety occasionally show painting with linear designs in black or violet. The designs include horizontal bands, groups of vertical lines running all over the body, oblique strokes, criss-cross, wavy lines and concentric semicircles. The important shapes represented in the pottery of this phase include: vase with featureless rim, constricted neck luted to globular body with external ridge in between; deep bowl with featureless rim; lipped bowl; channel-spouted bowl; spouted vessel; and basin and wide-mouthed vases. The microlithic tool (fig. 2) industry is represented by simple parallel-sided blades, backed blades, pen

knife backed with notch, bladclcts, blade-scrappers, symmetrical and asymmetrical crescents, crcsccntic points, point with retouch near tip, besides fluted cores which may be long conical

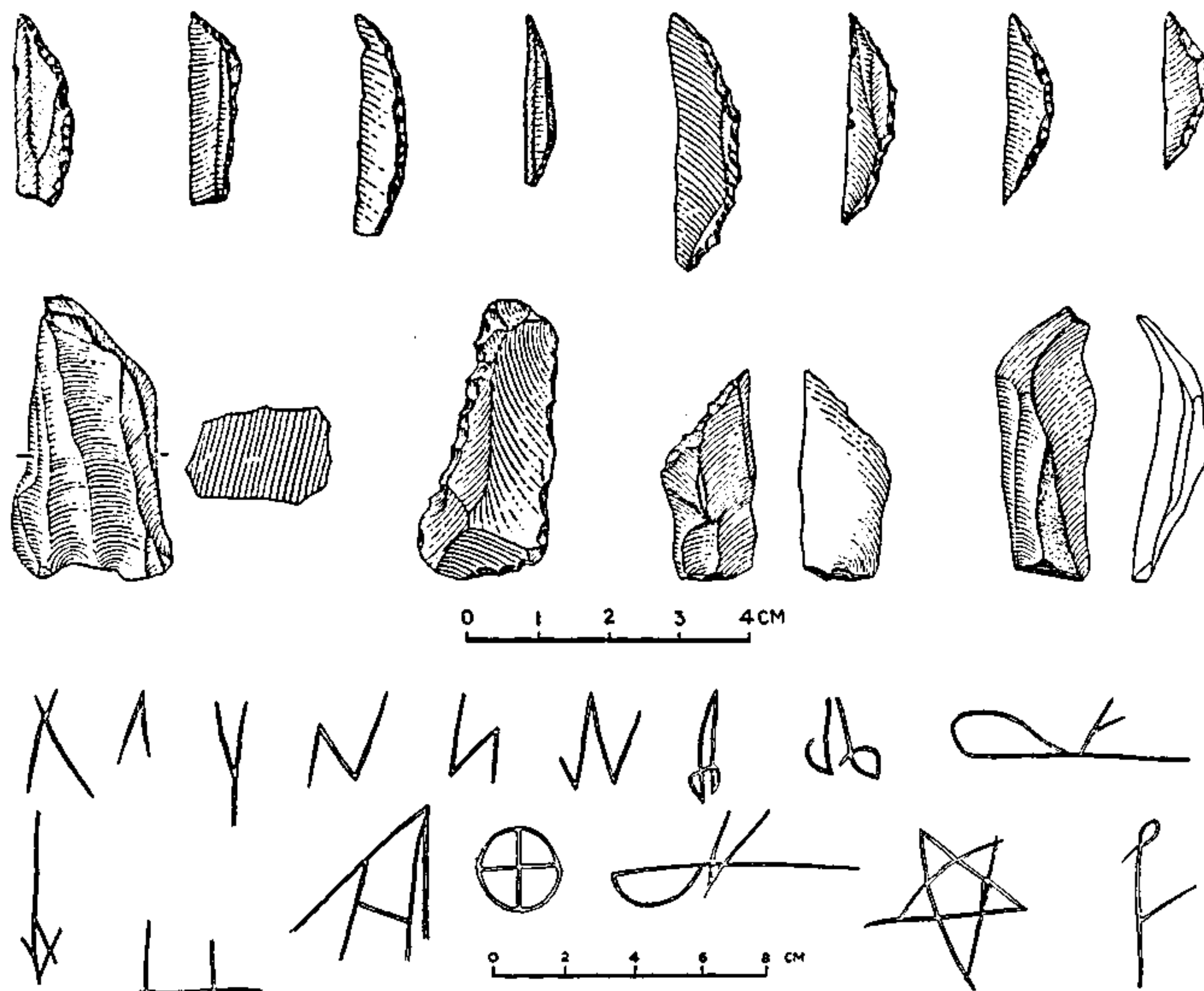


FIG. 2. *Ramapurum : microlithic tools and graffiti marks*

or flat. The raw material used for manufacturing the tools is mainly chert but specimens made on agate, chalcedony, quartz and quartzite are also present. That the people of this sub-period had the knowledge of copper is attested to by the occurrence of one piece of coiled wire and a few fragments of unidentified objects. Other important antiquities are steatite disc beads of various diameters.

Period I B is in fact continuation of the preceeding phase but for the conspicuous absence of the microlithic tool industry. However, handmade burnished grey-and-brown ware makes its appearance, and also there is a noticeable increase in the frequency of the occurrence of the painted red ware. Other important finds include terracotta, beads, copper tongue of a bell and hop-scotches.

Period I C is a further continuation of the preceeding phase, but it witnessed the introduction of iron technology. However, the use of copper was also noticed. Moreover, the grey-and-

P.M.Bhope

0 5 10 CM.

FIG. 3. *Ramapuram : copper objects*

brown ware shows remarkable improvement; in fact, by the end of this phase it emerges as the true black-and-red ware. The black-and-red ware from this site, therefore, seems to a local innovation but with some foreign influences as reflected in the occurrence of new types like lid with finial, hour-glass type stand, etc., in the pottery of the phase. The ceramic industry, too, shows remarkable improvement in introducing slow-wheel for the manufacture of some typical shapes like water-pitchers, bowl with ring-base and especially burial pots. This sub-period was found to be rich in copper objects (fig. 3) such as celts, chisel, tongs, razor or scraper, coiled wire, needle etc, (pl. I). Iron objects (pl. Ill), recovered mostly from the burials, include spear-head, arrowhead, razor, scraper or cobbler's tool, nail-like objects, etc; most interesting iron objects found in a burial is a *parasu*-like object with thin section (pl. IV A). Other important antiquities include beads of shell (pl. V B), bone, terracotta and steatite (pl. V A), terracotta bulls, one of which bears red bands painted on the body and stylized animal heads (Pl. IV B) probably attached to pots. Another important find is perforated lipped bowls, having four, five, six or eight lips. Most of these deep bowls have twenty-five perforations at the bottom but some have as many as seventy-five and one hundred and twenty-one perforations.

Burials encountered in Period I C which are invariably in the habitation, some inside the house and other outside, are of four types: (i) single-urn (kept vertically), (ii) double-urn (pl. VII A), (iii) oblong cist, and (iv) pit-burial (pl. VI A). All the burials had cairn packing (pl. VI B) but no circle stones. They are invariably oriented north-south, and contain post-excarnated skeletal remains including skulls, which are invariably kept on the north facing west, long bones and occasionally other bones as well. Further, it was found that the feet were intentionally chopped off. The double-urn burial was not only used for burying children but also adults (pl. VII B); even cist burials (pl. VIII) had skeletal remains of single person either adult or child. These burials had vases of red, black-and-red and black wares, besides iron objects.

People representing all the three phases lived in huts built of perishable materials, and the plans of the huts, (pl. II) were either circular (ranging from 8.2 to 2.2 m in diameter) or oval (sizes ranging from 11.1 x 9.1 to 3.15 x 2.20 m). However, in Period I C, only one hut with apsidal plan was encountered. The huts were provided with slab piece lining on the exterior. Wherever the lining of slab pieces was missing only a shallow channel dug for fixing the slab pieces was found. People domesticated[1] animals like *Bos indicus* (cattle), *Bubalus bubalis* (buffalo), *Capra aegagrus* (goat), *Oris aries* (sheep), *Sus scrofa cristatus* (pig), etc. It is interesting to know that there is some indication for killing cattle at a very advanced age. If the cattle was kept only for food purposes, the inhabitants would have killed these animals at an early age, possibly around the age of three when the meat is tender and in plenty. It is possible, therefore, that the inhabitants kept these as domesticated animals, some of them being used for agricultural purposes. As there is a scarcity of vertabrae, ribs and lower parts of the limb-bones in the collection, it seems that majority of these animals were slaughtered outside the habitation and later the flesh-bearing parts brought in. The inhabitants supplemented their food economy by occasionally hunting wild animals like *Cervus Unicolor* (sambar), *Gazella Gazella* (chinkara) and birds. It is also certain that they exploited aquatic resources like mollusc and fish. The presence of a few pieces of marine shells indicate that the people might have contacts with outsiders living nearer the sea. The technology of bone tool was also not unknown to these people and bone objects include comb-like objects, scraper, borer, point, antimony rod etc.

10. EXPLORATION IN DISTRICT MAHABUBNAGAR.—The Department of Archaeology and Museums, Government of Andhra Pradesh, explored around the village Aija and located an

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information from Zoo-archaeologist of the Deccan College Post-graduate and Research Institute, Pune.

ash-mound containing polished celts, adzes and stone axes. The pottery is represented by globular pots, dishes, bowls, and storage jars treated with black polish.

Besides, a temple belonging to Chalukyan period was noticed at Marthandeswara.

Exploration round the village Urukonda yielded a number of megalithic burials also noticed at Dhapur, Jannichedu and Uppair.

11. EXPLORATION IN DISTRICT NELLORE.—In the course of exploration, the Registering Officer of the Department of Archaeology and Museums, Government of Andhra Pradesh, located two mounds at Duggirajpatnam near the coast of Bay of Bengal. Both the sites yielded red polished ware.

12. EXPLORATION IN DISTRICT PRAKASAM.— The Registering Officer of the Department of Archaeology and Museums, Government of Andhra Pradesh, located ancient mound at Vikralapet yielding a large number of red and black polished ware including plain and painted sherds.

13. EXCAVATION AT KEESARAGUTTA, DISTRICT RANGAREDDY.—The Department of Archaeology and Museums, Government of Andhra Pradesh, undertook excavation with a view to establishing the cultural sequence of the site, and as a result, six different structures were recorded. These structures belonged to ritualistic (temple) and secular architecture.

14. EXPLORATION IN DISTRICT WARANGAL.—The Registering Officer of the Department of Archaeology and Museums, Government of Andhra Pradesh, carried out exploration around the village Kotamita and found Rouletted Ware, besides a few other potter)-.

ARUNACHAL PRADESH

15. EXPLORATION IN DISTRICT KAMENG.—D. K. Bora of the Directorate of Research (Archaeology), Government of Arunachal Pradesh, carried out exploration at the village Naksaparbat and found a number of carved pillars along with other remains.

16. EXPLORATION IN DISTRICT LOHIT.—D. K. Bora of the Directorate of Research (Archaeology), Government of Arunachal Pradesh, located two mounds, earthen rampart, and stone pillars belonging to the Ahom period in course of exploration around the village Manambhum.

BIHAR

17. EXPLORATION IN DISTRICT CHAPRA.—J. P. Mehrotra of the Mid-eastern Circle of the Survey, located an ancient mound at Bhinda in the village Hussan Ali Bazar. It yielded late medieval pottery.

J. P. Mehrotra and A. N. Roy of the Survey discovered black-and-red ware and the Northern Black Polished Ware, including a few terracotta beads, at Revelganj.

18. EXPLORATION IN DISTRICT GAYA.—The Department of Archaeology and Museums, Government of Bihar, in the course of exploration, brought to light several terracotta ring-wells at Bhusanda on the exposed section of the river Phalgu. At the village Mangrawa, evidence of black-and-red, Northern Black Polished and black-slipped wares were also noticed. Exploration around Raungarh yielded a number of black-and-red ware sherds, occasionally painted, and

a dish-on-stand. The site also yielded Northern Black Polished Ware and red ware belonging to the early historic period.

19. EXPLORATION IN DISTRICT GIRIDIH.—J. P. Mehrotra and B. Nath of the Mid-eastern Circle of the Survey discovered at the village Chak, remains of a brick temple and stone sculptures representing standing figure of Surya, Uma-Mahesvara, etc.

20. EXPLORATION IN DISTRICT MONGHYR.—Vidula Jayaswal, assisted by the Postgraduate students of the Department of Ancient Indian History, Culture and Archaeology, Banaras Hindu University, undertook intensive Survey of the area around Paisra (Long. 86°28' E; and Lat. 25°9'N). Achculian artefacts were found in clusters on the foot of the Darbara hill, between the villages Bariara and Changvada (a stretch of one kilometre). Cleaning of three such clusters showed that a number of these were more or less undisturbed and were actual tool-manufacturing spots. The clusters were formed by limited number of Acheulian implements, cores, flakes and abundance of waste-chips and quartzite lumps (the raw material used for tools).

Probings and section-scraping in this area revealed a definite tool-bearing deposit of 40-80 cm, which is composed of small nodules and disintegrated rocks, and was found lying directly on the bed-rock. The deposit contained Achculian artefacts in fresh condition. At places, it is overlain by a thick compact yellow earth layer (4 to 6 m thick), and loose ochre soil deposit (20 to 60 cm thick) respectively. However, both these layers are devoid of artefacts. It is thus apparent that the area around Paisra was a habitat of an advanced Acheulian man for quite some time.

21. EXCAVATION AT APIISAD, DISTRICT NAWADAH.—In continuation of last year's *(1979-80,* p. 14) work Prakash Charan Prasad assisted by Krishan Kant Sharma, Lakshman Prasad Singh, Jamil Akhtar, N. C. Ghosh, Raghunath Prasad Verma and Uma Shankar Pandit under the general supervision of Sita Ram Roy of the Department of Archaeology and Museums, Government of Bihar, resumed excavation at Aphsad.

Excavation confirmed the last year's observation and brought to light five diminishing tiers of the Vishnu temple (pl. IX A). The main shrine was approached by a flight of steps. The wall surface of the temple was finished with plaster whereas the floor was given a brick sloping and finally rammed with brickbats. A row of five small shrines were uncovered over the first tier towards the east. The excavation yielded an inscribed terracotta sealing, a terracotta mould, iron objects like nails and a stucco head of Brahma, stone figure of Dandi and a *Siva-linga.* The occurrence of the Northern Black Polished Ware indicates the existence of an earlier beginning of the site.

22. EXPLORATION IN DISTRICT RANCHI.—B. S. Jha of the Mid-eastern Circle of the Survey, in course of his exploration, noticed two ancient mounds at Ite and Hansa yielding iron slags and implements, besides red ware datable to the Kushana period.

23. EXCAVATION AT CHIRAND, DISTRICT SARAN.—B. Narain and A. K. Singh assisted by B. K. Jamuar and S. K. Kaviraj under the guidence of B. Sahai of the Department of Ancient Indian History and Archaeology, Patna University, under the scheme sanctioned by the University Grants Commission, Government of India, carried out excavation with a view to ascertaining the structural phases in relation to cultural sequence at the site.

Excavation yielded from the lower level polished celts, terracotta figurines, stone beads, dish-on-stand in black-and-red ware along with iron.

The succeeding occupation is represented by brick structures. The pottery include fine variety of the Northern Black Polished Ware sherds. Antiquities discovered consist of stone beads and terracotta animal figurines.

The next level is characterized by the presence of the Northern Black Polished Ware of late variety and its associated wares. A number of brick structures, including ring-wells and drains, were encountered. Notable antiquities include bone objects like points, socketed arrow-head, stylus, copper antimony rod and terracotta animal figurines.

The latest cultural deposit is represented by pottery typical of the Kushana period. Other finds include glass and copper beads, iron spearhead, clay sealing of the Gupta period, terracotta objects like ear-lobe and human figurines.

Besides, a coin hoard of the British period was encountered about 1 km away from the aforesaid site in course of a trial digging.

GOA, DAMAN AND DIU

24. EXPLORATIONS IN GOA.—The Archaeology Unit of the Directorate of Archives, Archaeology and Museums, Panaji, Goa, carried out village-to-village survey of loose sculptures, monuments and forts at Ponda, Pernem, Sanguem, Sasashti, Marmagoa, Canacora, Dicholi and Goa Taluks.

GUJARAT

25. EXPLORATION IN DISTRICT AHMADABAD.—R. N. Mehta, of the Department of Archaeology and Ancient History, M. S. University of Baroda, while studying the development of ancient city of Ahmadabad found the surrounding suburban area gradually merging with the main city complex. The archaeological evidence of bricks and remains of outer fortification indicate the construction of the city probably in the late sixteenth or early seventeenth century.

26. EXPLORATION IN DISTRICT AMRELI, BANAS KANTHA, MAHESANA, PANCH MAHALS, RAJKOT, SABAR KANTHA AND VADODARA.—The Department of Archaeology, Government of Gujarat, in the course of their explorations, located the following sites of archaeological interest.

District	*Taluk*	*Sitejvillage*	*Cultural assemblage*
Amreli	Rajula	Uchia	step-well (fifteenth century AD)
Banas Kantha	Disa	Akhol Nani	medieval
-do-	Kankrej	Tervada	sculptures of Chaturbhuja Gancsa (Maitraka period), dancing Ganesa 9th century AD), Parvati (l0th-llth century AD), Siva (13th century AD)
Banas Kantha	Radhanpur	Radhanpur	medieval
-do-	-do-	Terwada	medieval
-do-	Santolpur	Varahi	medieval
Kutch	Bhachau	Chobari	step-well (16th century AD)
-do-	-do-	Ner	Harappan
-do-	-do-	Samakhiyari	Chatardi (memorial pavilion) (18th century AD)
-do-	Bhuj	Meghper	Harappan
-do-	-do-	Sanosara	Late Stone Age
-do-	-do-	Sarali	Late Stone Age
Mahesana	Harij	Khakhadi	medieval

District	*Taluk*	*Site/village*	*Cultural assembge*
Mahesana	Kalol	Bhimasan	sculpture of Lakshminarayana, Vishnu and Kailyamardan (12-13th century century AD)
-do-	-do-	Mevad	sculpture of Adivaraha and Vishnu 11th-12 th century AD
-do--	-do--	Palodia	Early Stone Age
do--	do--	Piyaj	medieval
do--	do--	Soja Vasajada	medieval
do-	do-	Dhedia	Early Stone Age
-do-	Mahesana	Ambasan	sculptures of Mahisa mardini (14th-15th century AD), Ganesa (17th century AD) Kaliyamardan (13th-14th century AD), Bhairava, Lakshminarayana and Vishnu (13th century AD)
-do	-do-	Diwanpura	medieval
Panch Mahals	Dahod	Dahod	Vishnu-patta (13th century AD)
-do—	Jalat	Jalat	*vyala* (8th-9th century AD)
do-	Santrampur	Raynia	Saptamartrika-patta and mosque (15th century AD) and image of Ganesa (14th-15 th century AD)
Rajkot	Jasadan	Pipalia	Harappan
Sabar Kantha	Bayad	Ambaliyara	medieval
Vadodara	Savali	Moxi	medieval
-do-	Vaghodia	Goraj	sculptures of Siva and Gaja-Lakshmi (9th-10th century AD), Naranarayana and Parvati (10th-11th century AD), Nandi (12th-13th century AD), and Siva (13th century AD)
Vadodara	Vaghodia	Limbada	sculpture of Nandi and *jaladhari*-Siva.-linga (12th-13th century AD)
-do-	-do-	Mahadevpura (Sandhiapura)	sculptures of Parvati, Varahi and Vinadhara Siva (all 10th-11th century AD), and Nandi (8th-9th century AD)
-do--	Vaghodia -	Mastupura	memorial stone (12th-13th century AD)
do-	do-	Piplia	Yogini, Mahishasuramardini, Parvati and Nandi (all 13 th century AD)
-do-	-do-	Rasulabad	memorial stone (12th-13th century AD), and Yogesvara Siva (9th-10th century AD)

27. EXCAVATION AT SURPAN, DISTRICT BHARUCH.—K. Raghavachary, assisted by P. K. Trivedi, S. S. Nayak, A. R. Shah of the Western Circle of the Survey conducted excavation at Surpanaesvar temple with a view to finding out the antiquity of the temple.

Excavation revealed earlier brick structures (size 35 x 22 x 8 cm) below Surpanesvara and Rajarajesvara temples. A few pieces of Kaolin ware along with some pieces of sprinklers assignable to the early historical period were associated with the level.

28. EXPLORATION IN DISTRICTS BHARUCH AND VADODARA.—In continuation of the previous year's *(1979-80,* p. 23) work, K. Raghavachary assisted by P. K. Trivedi, A. R. Shah and K. D. Tripathi of the Western Circle of the Survey explored thirteen villages and noticed a bust of Siva and Parvati at Pylighat, assignable to twelfth-thirteenth century.

29. EXPLORATION IN DISTRICT BHAVNAGAR.—V. K. Jairath, a Research Scholar of the Department of Archaeology and Ancient History, M. S. University, Baroda, under the Village-to-Village Survey Scheme located the following sites of archaeological interest.

Taluk	*Site/villa ge*	*Cultural asstmblage*
Valabhipur	Nasitpur	Harappan and medieval
-do--	Mevasa	medieval
do--	Pipli	Late Stone Age and early historical
do-	Juna Rampur	Late Stone Age, Harappan, early historical and medieval.
-do-	Haliad	early historical and medieval
-do-	Pati	early historical and medieval
-do-	Chada	medieval
-do-	Pa tana	Harappan and medieval
-do-	Malpara	medieval
-do-	Virdi	medieval
-do-	Anandpur	medieval
-do-	Ujalrar	medieval
Bhavnagar	Vartej	medieval
-do-	Adhevada	Late Stone Age
Bhavnagar	Malanka	medieval
-do-	Akvada	Late Stone Age, Harappan, early historical and medieval
-do-	Sidsar	Late Stone Age, Harappan, early historical and medieval
-do-	Tarasamra	Harappan and medieval
-do-	Bhojpura	medieval
-do-	Budhel	Harappan
-do-	Hathab	Harappan
-do-	Undvi	medieval
-do-	Thalsar	medieval
-do-	Bhadi	early historical
-do-	Khadsaliya	early historical
-do-	Shedhavadar	early historical and medieval
-do-	Fariyadka	Harappan
Gogha	Gogha	medieval
-do-	Kherakdi	medieval
Bhavnagar	Bhandaria	medieval
-do-	Ruva	medieval
Bhavnagar	Nagdjanimba	medieval
-do-	Bhumbhali	medieval
-do-	Koliyak	medieval
Gogha	Valukad	medieval

30. EXCAVATION IN DISTRICT JAMNAGAR.—Kuldeep K. Bhan, a Research Scholar of the Department of Archaeology and Ancient History, M. S. University, Baroda, under the Village-to-Village Survey Scheme noticed the following sites of archaeological interest.

Taluk	*Site/village*	*Cultural assemblage*
Kalvad	Manzewada	early historical
-do--	Aralee	Harappan
do--	Kotada	Late Stone Age and Harappan
do--	Juna Bhagcdi	medieval
do--	Pccr-ni-darga	Harappan
do--	June timbo	medieval
do--	Timbo	Harappan
do--	Fulzar	medieval
do--	Paneli	early historical
do--	Saparwadi	Harappan and early historical
do--	Laloi-no-Timbo	Harappan lithic industry
do--	Kutharivad	Last Stone Age and Harappan
do--	Khandari	medieval
do--	Timbu	medieval and Late Stone Age
do--	Rajwada	Late Stone Age
do--	Timbo	Harappan
do--	Sheshadi-ka-dora	early historical
do--	Kalvad I	Harappan
do--	Kalvad II	Harappan and medieval
do--	Kalvad III	Harappan
do-	Kalvad IV (River Kalavadi)	Middle Stone Age
Lalpur	Peervala	Harappan lithic industry, Harappan and early historical
-do-	Timbi I	Late Stone Age, Harappan
-do-	Timbi II	early historical
-do-	Juna Godavari	medieval
-do-	Dharampur	Late Stone Age
-do-	Mungatoda	Harappan and early historical
-do-	Boriya	early historical
-do-	June Timbi	Harappan
-do-	Talwadi	Harappan
-do-	Pancha pipro	Harappan
-do-	Ranpur	Harappan
-do-	Sewak Bhalia I	early historical
-do-	Sewak Bhalia II	early historical
-do-	Peer-ni-durgha	Harappan
-do-	Oliya Peer	Harappan
Jamjodhpur	Hanuman-no- timbo	early historical
-do--do-	Vavadi	early historical
	Machavadi	early historical

28. EXPLORATION IN DISTRICTS BHARUCH AND VADODARA.—In continuation of the previous year's (*1979-80,* p. 23) work, K. Raghavachary assisted by P. K. Trivcdi, A. R. Shah and K. D. Tripathi of the Western Circle of the Survey explored thirteen villages and noticed a bust of Siva and Parvati at Pylighat, assignable to twelfth-thirteenth century.

29. EXPLORATION IN DISTRICT BHAVNAGAR.—V. K. Jairath, a Research Scholar of the Department of Archaeology and Ancient History, M. S. University, Haroda, under the Village-to-Village Survey Scheme located the following sites of archaeological interest.

Taluk	*Site/villa ge*	*Cultural assemblage*
Valabhipur	Nasitpur	Harappan and medieval
-do--	Mcvasa	medieval
do--	Pipli	Late Stone Age and early historical
do-	Juna Rampur	Late Stone Age, Harappan, early historical and medieval.
-do-	Haliad	early historical and medieval
-do-	Pati	early historical and medieval
-do-	Chada	medieval
-do-	Patana	Harappan and medieval
-do-	Malpara	medieval
-do-	Virdi	medieval
-do-	Anandpur	medieval
-do-	Ujalrar	medieval
Bhavnagar	Vartej	medieval
-do-	Adhevada	Late Stone Age
Bhavnagar	Malanka	medieval
-do-	Akvada	Late Stone Age, Harappan, early historical and medieval
-do-	Sidsar	Late Stone Age, Harappan, early historical and medieval
-do-	Tarasamra •	Harappan and medieval
-do-	Bhojpura	medieval
-do-	Budhel	Harappan
-do-	Hathab	Harappan
-do-	Undvi	medieval
-do-	Thalsar	medieval
-do-	Bhadi	early historical
-do-	Khadsaliya	early historical
-do-	Shedhavadar	early historical and medieval
-do-	Fariyadka	Harappan
Gogha	Gogha	medieval
-do	Kherakdi	medieval
Bhavnagar	Bhandaria	medieval
-do-	Ruva	medieval
Bhavnagar	Nagdjanimba	medieval
-do-	Bhumbhali	medieval
-do-	Koliyak	medieval
Gogha	Valukad	medieval

30. EXCAVATION IN DISTRICT JAMNAGAR.—Kuldeep K. Bhan, a Research Scholar of the Department of Archaeology and Ancient History, M. S. University, Baroda, under the Village-to-Village Survey Scheme noticed the following sites of archaeological interest.

Taluk	*Site/village*	*Cultural assemblage*
Kalvad	Manzcwada	early historical
-do--	Aralcc	Harappan
do--	Kotada	Late Stone Age and Harappan
do--	Juna Bhagcdi	medieval
do--	Pccr-ni-darga	Harappan
do--	June timbo	medieval
do--	Timbo	Harappan
do--	Fulzar	medieval
do--	Paneli	early historical
do--	Sapanvadi	Harappan and early historical
do--	Laloi-no-Timbo	Harappan lithic industry
do--	Kutharivad	Last Stone Age and Harappan
do--	Khandari	medieval
do--	Timbu	medieval and Late Stone Age
do--	Rajwada	Late Stone Age
do--	Timbo	Harappan
do--	Sheshadi-ka-dora	early historical
do--	Kalvad I	Harappan
do--	Kalvad II	Harappan and medieval
do--	Kalvad III	Harappan
do-	Kalvad IV (River Kalavadi)	Middle Stone Age
Lalpur	Peervala	Harappan lithic industry, Harappan and early historical
-do-	Timbi I	Late Stone Age, Harappan
-do-	Timbi II	early historical
-do-	Juna Godavari	medieval
-do-	Dharampur	Late Stone Age
-do-	Mungatoda	Harappan and early historical
-do-	Boriya	early historical
-do-	June Timbi	Harappan
-do-	Talwadi	Harappan
-do-	Pancha pipro	Harappan
-do-	Ranpur	Harappan
-do-	Sewak Bhalia I	early historical
-do-	Sewak Bhalia II	early historical
-do-	Peer-ni-durgha	Harappan
-do-	Oliya Peer	Harappan
Jamjodhpur	Hanuman-no-timbo	early historical
-do--do-	Vavadi	early historical
	Machavadi	early historical

Taluk	*Site/village*	*Cultural assemblage*
Jamjodhpur	Gadia	early historical
-do-	Narmana	Harappan
-do-	Boriya	Harappan
-do-	Gop	early historical
Khambhaliya	Peer-ni-dargha	early historical and medieval sculpture
-do-	Juna Sinhan	early historical
-do-	Kola	Late Stone Age, Harappan and early historical
-do-	Bharana	medieval
-do-	Zakasia	medieval
-do-	Dingeshwar	medieval
-do-	Vadrta	early historical
Okhamandal	Nilkunte Mahadcva	medieval and medieval sculpture
Khambhaliya	Datrana	medieval
Okhamandal	Dwarka	medieval sculpture
-do-	Dhrasenval	medieval
-do-	Nageshwar	Harappan
-do-	Beyt	medieval
-do-	Juni Dhinaki	medieval
-do-	Vasai	medieval
-do-	Kuranja	early historical
-do-	Wedza	medieval
-do-	Savana	early historical

31. EXPLORATION IN DISTRICT JUNAGADH.—The Department of Archaeology Government of Gujarat and the Department of Archaeology and Ancient History, M. S. University, Baroda, jointly in course of exploration along the bank of the river Sonarekh at Junagadh city discovered a few Roman amphora, Red Polished Ware and other ceramic types datable to the early historical period.

Further exploration around Junagadh city revealed interesting evidence about the development and shifting pattern of the urban settlement.

32. EXCAVATION AT PABUMATH, DISTRICT KUTCH.—In continuation of last year's (*1978-79,* pp. 67-68) work, the Department of Archaeology, Government of Gujarat, resumed excavation at the Harappan site of Pabumath.

The excavation revealed the evidence of a large building complex (pl. X) besides an inscribed seal bearing a unicorn motif. Other finds include: bangles and bead in shell; awl; bangle, needle and antimony rods in copper; steatite micro-beads and faience beads. Pottery is represented by large and medium size jars, goblet, beaker, steep-sided dish, dish-on-stand, perforated jars etc. Fine red pottery often bears black painted designs such as criss-cross, wavy lines, loops and hatched ferns. The excavation also yielded remains of animal bones belonging to cattle, buffalo, goat, sheep, wild pig, rabbit, and fish.

33. EXPLORATION IN DISTRICT SURAT.—S. S. Nayak of the Western Circle of the Survey in course of exploration noticed memorial stones and pillars, brass images, temples, stone

sculptures belonging to late mediaeval period at Bhagwa, Kotra, Karanig, Asanad, Takarama, Mindhi, Jinod, Mor, Mirajapur, Pardi-zankhari, Thothal and Kamaroli.

34. EXPLORATION IN DISTRICT VADODARA.—The Department of Archaeology and Ancient History, M. S. University, Baroda, carried out salvage work around Kalabhavan at Baroda and encountered potsherds, animal bones, terracotta and stone objects datable to medieval times.

HARYANA

35. EXPLORATION IN DISTRICT AMBALA.—Manmohan Kumar of Kurukshetra University assisted by Sanjiv and P. S. Gill of Anthropology Department, Punjab University, Chandigarh, carried out exploration around Chandigarh and located a Stone Age site on a terrace of river Cho, near the village Nadha and Naya Gram. Artifacts include Acheulian handaxe, scraper along with cores and flakes associated with some fossils represented by phalanx of an ancient goat.

36. EXCAVATION AT AGROHA, DISTRICT HISSAR.—In continuation of the last season's (p. 31) work P. K. Sharan with the assistance of Madhav Acharya and Brahmdutt of the Department of Archaeology, Haryana, resumed excavation at the site. The main objectives of the dig were: (i) to determine constructional phases of the temple no. 2; (ii) to ascertain the earliest settlement in that part of the site in order to confirm the last season's work; (iii) to fully expose the temple no. 2; and (iv) to outline the habitation near the temple complex."

Last year the southern wall of Temple no. 2 outside the *pradakshina-path* of Temple no. 1, was exposed and it was found that the bricks (38 x 24 x 6 cm) used were different from those of Temple no. 1. As a result of this season's work, the plan of the four building phases have been brought to light. In the first phase, which was partially exposed, the temple had a sanctum, a small vestible with a portico in the front with the entrance from the north. It is very likely that the earliest temple was built on a high platform which was further raised during every subsequent phase but the total height of the platform could not be ascertained. The temple measures approximately 15 m north-south and 11.50 m east-west. A 7-metre wide stair-way was provided on the north for access.

In phase II, the platform was raised and its entrance was shifted to the east while its sanctum was reduced to make a provision for *pradakshina-path* of 080 (east-west) x 1.20 m (north-south) with brick jelly flooring around. Though mostly brick-bats were found used in construction, the exterior of the walls were veneered with full bricks measuring 37 x 24 x 8 and 35 x 22 x 3 cm. A small entrance from the back side i.e. the west had also been provided. To scale the height of the platform a staircase was added. During phase II, the temple was enlarged and the portico of the phase I was converted into a sub-shrine for which the entrance was provided to the north. Baked bricks (25 x 19 x4 cm) were used to pave the circumambulatory path laid around the sub-shrine. The platform of the main temple was also raised further and the entrance was pushed towards the east; as a result, the space in between the sanctum and the entrance turned into a vestibule.

The fourth and last phase of the temple demonstrates a period of decline. Mostly the brickbats of the previous phases were reused in construction, besides using inferior quality of bricks of the size of 27 x 20 x 4 cm. Common staircase and vestibule were provided for both the temples, and the northern entrance for the sub-shrine was closed. No sign of *pradakshina-path* of this phase has been encountered so far.

A number of Gupta terracottas had been recovered from the phase I of the temple, while a few sculptured pieces in Gurjara-Pratihara style were unearthed from the debris of the last

phase. All these suggest a time-bracket of *circa* fourth century AD to eleventh century for the four phases of the temple.

37. EXPLORATIONS IN DISTRICT HISSAR.—Dhoop Singh and Chandcrpal Singh of the Department of Archaeology and Museums, Haryana, discovered the following sites in the course of the Village-to-Village Survey :—

Tehsil	*Villagejsile*	*Cultural assemblage*
Hissar	Kheri Barki I	Harappan
-do-	Kirtan	Harappan
Hansi	Rakhi Garhi	Pre-Harappan, Harappan and late Harappan
-do-	Rajpura	Harappan
-do-	Chanat I	Harappan
-do-	Garhi I	Late Harappan
-do-	Sisai Kaliravan I + IV	Late Harappan
-do-	Sisai Bola I + II	Late Harappan
-do-	Lohauni Raghu I + II	Late Harappan
-do-	Masudpur I, II, III, IV	Harappan and late Harappan
-do-	Mirchpur III	Late Harappan
-do-	Nathwan	Harappan and medieval
Hissar	Kharar	Harappan and late Harappan
-do-	Satrand Khas II	Harappan
Tohana	Ratta Theh	Pre-Harappan and Harappan
-do--	Gulanvala I	Pre-Harappan and Harappan
do-	Talwara I	Painted Grey (PG) Ware, black-slipped ware, associated red ware and early historical
-do-	Karandi II	PG Ware and associated red ware
-do-	Rupanwali	PG Ware, black-slipped ware and associated red ware
-do-	Divvana I	PG Ware, and black-slipped ware
-do-	Kahanari	PG Ware, black-slipped ware and associated red ware
-do-	Nagla	PG Ware, black-slipped ware and associated red ware
-do-	Parta	Grey ware, black-slipped ware, associated red ware and historical
Hissar	Chandar Khurad	PG Ware, black-slipped ware, associated red ware, early historical and medieval
-do-	Chamarkhera	PG Ware, black-slipped ware, associated red ware, early historical and medieval
Hansi	Dhani Kumarinia	PG Ware
-do-	Narnaund	PG Ware
-do-	Thurana I	PG Ware and associated red ware
-do-	Majra I	PG Ware
-do-	Dhani Brahmanwali	PG Ware
-do-		

Tehsil	*Village/site*	*Cultural assemblage*
Haasi	Madanheri	PG Ware, black-polished ware and early historical
-do-	Bas Azamshahpur	PG Ware and black-polished ware
-do-	Bhaklana I	PG Ware, black-polished ware and early historical
-do-	Kani Kheri	PG Ware and black-polished ware
-do-	Kagsar	PG Ware and black-polished ware
-do-	Kheri Rangharan II	PG Ware and black-slipped ware and historical
-do-	Garhi II	historical
-do-	Sisar	historical
-do-	Kharbala	historical
-do-	Singhwa Khas	historical
-do-	Putti	historical and medieval
-do-	Mehnada	historical and medieval
-do-	Narnaud	historical and medieval
-do-	Sulchani	historical and medieval
-do-	Patwar	historical and medieval
-do-	Thurana II	historical and medieval
-do-	Bhatal Rangham	historical and medieval
-do-	Majra II	historical and medieval
-do-	Pali	historical
-do-	Sisai Kaliravam III	historical and medieval .
-do-	Saladheri	historical and medieval
-do-	Khajla	historical and medieval
-do-	Lohari Raghu III	historical
-do-	Moth Rangham	historical and medieval
-do-	Sulkhani	historical
-do-	Gharai	historical and medieval
-do-	Rajli	historical
-do-	Masudpur IV	historical
-do-	Tharwa	historical and medieval
-do-	Datta	historical
-do-	Bhatla	historical and medieval
-do-	Khokha I +II	historical
-do-	Kharkani I + II	historical and medieval
-do-	Chanat II	historical and medieval
-do-	Chhan	historical and medieval
-do-	Sotha	historical
-do-	Mirchpur I, II, IV	historical and medieval
-do-	Budana	historical
-do-	Milakpur	historical and medieval
-do-	Gamara	historical
-do-	Dhad II	historical and medieval
-do-	Bayana Khera	historical
-do-	Gurana	historical

Tehsil	*Village/site*	*Ccultural assemblage*
Hissar	Panghal I	historical and medieval
-do-	Khedar	historical
-do-	Ishrheni	historical and medieval
-do-	Daulatpur	historical and medieval
-do-	Uklana	historical and medieval
-do-	Mugalpawa	historical and medieval
-do-	Dhansu	historical
-do-	Bugana	historical
-do-	Juglan	historical and medieval
-do-	Baddo Patti	historical
-do-	Kironi	historical
Hissar	Sarsaud	historical and medieval
-do-	Hichhpari	historical
-do-	Jayoura	historical and medieval
-do-	Gabipur	historical and medieval
-do-	Surhra	historical
-do-	Landhani	historical
-do-	Hissar bir I+11	historical and medieval
-do-	Jakhod Khera I+ 11	historical and medieval
-do-	Salamgarh III	historical and medieval
Tohana	Damkoura	historical
-do--	Kudni	historical
do--	Himatpura	historical
do--	Talwara I+II	historical
do--	Sadhanwas II + III	historical
do--	Sadhani	historical
do--	Mudhlian II	historical
do--	Musa Khera II	historical
do-	Karandi I	historical
Tohana	Jamalpur Sakhon	historical
-do--	Maimand	historical
do--	Javatawala	historical
do--	Dher	historical
do--	Gularwala II	historical
do--	Hadanwala	historical
do--	Nathuwal	historical
do--	Chellawal	historical
do--	Chatan	historical
do--	Surewala	historical
do--	Parta	historical
do--	Pirthala	historical
do--	Laloda I	historical
do--	Bhadhai Khera II	historical
do--	Dangra	historical
do-	Bhodia Khera II	historical

Tehsil	*Village /sile*	*Cultural assemblage*
Tohana	Chandra Khurad	historical
-do--	Bhodi	historical
do--	Sanyana	historical
do--	Chamar Khcra	historical
do--	Sahu	historical
do--	Tohana	medieval
do--	Udaypur	medieval
do--	Himmatpura	medieval
do--	Kasimpur	medieval
do--	Sadauwas I	medieval
do--	Mudlian I	medieval
do--	Musa-Khera I	medieval
do--	Shankarpura	medieval
do--	Lahra Khera	medieval
do--	Karandi I	medieval
do--	Jamalpur Shckan	medieval
do--	Slampuri	medieval
do--	Maimand	medieval
do--	Kulan	medieval
do--	Javantawala	medieval
do--	Dharsaul	medieval
do--	Diwana II	medieval
do--	Budanpur	medieval
do--	Mamupur	medieval
do--	Nadal	medieval
do--	Girnu	medieval
do--	Suman	medieval
do--	Nagli	medieval
do--	Chitan	medieval
do--	Bhadhi Khera I	medieval
do--	Ratta Khera	medieval
do--	Bhodia Khera	medieval
do--	Chandar Khurd	medieval
do-	Bhodi	medieval
.do--	Borti	medieval
do--	Pokhri	medieval
do--	Sanyana	medieval
do--	Chamar Khera	medieval
do-	Sahu	medieval
Hissar	Mirka	medieval
-do-	Mangali Mehbat I+ 11	medieval
-do-	Gangwa	medieval
-do-	Dewa	medieval
-do-	Muklan	medieval
-do-	Kalwas	medieval
-do-	Kamri	medieval

Tehsil	*Village/site*	*Cultural assemblage*
Hissar	Singhram	medieval
-do-	Tokas	medieval
-do-	Patan I+II	medieval
-do-	Shahpur I+II	medieval
-do-	Siswala I+II+III	historical and medieval
-do-	Kharia	medieval
-do-	Dhiramwas	medieval
-do-	Revalwas Kalan	medieval
-do-	Sirsana	medieval
-do-	Bhiani Ruhlan	medieval
-do-	Dhobi	medieval
-do-	Satrand Klan	medieval
-do-	Satrond Khas I	medieval
-do-	Juglan	historical and medieval
-do-	Baddo Patti	medieval
-do-	Kheri Banki II	medieval
-do-	Sarsaud	medieval
-do-	Barwala	medieval
-do-	Bobuoa	medieval
-do-	Kharkhana	medieval
-do-	Matloda	medieval
-do-	Bhanbheri	medieval
-do-	Chikanwas	medieval
-do-	Salamgarh I+II	medieval
-do-	Kabrail I+II	medieval
Hansi	Mamanpura	medieval
-do-	Dhandhari I + II	medieval
-do-	Kutabpur Dhani I+II	medieval
-do-	Mayar	medieval
-do-	Mazhad	medieval
-do-	Khumbha	medieval
-do-	Bhatal Jatan	medieval
-do-	Kheri Gagan	medieval
-do-	Sisai Kabiravan III	medieval
-do-	Sotha	medieval
-do-	Sirsana	medieval
-do-	Kharak Punia	medieval
-do-	Panihari	medieval
-do-	Habatpura	medieval
-do-	Gandas Khera	medieval
-do-	Nara	medieval
-do-	Koth Klan	medieval
-do-	Dhad I	medieval
-do-	Sindhar	medieval
-do-	Panghal II	medieval
-do-	Putti II	medieval

Tehsil	*Village/site*	*Cultural assemblage*
Hansi	Bhaklana II	medieval
-do-	Ghuskani	medieval
Fathebad	Jagan	medieval
-do-	Moth Sarai I+ 11	medieval
-do-	Mahalsara	medieval
-do-	Kohli	medieval

JAMMU AND KASHMIR

36. EXCAVATION AT SEMTHAN, DISTRICT ANANTNAG.—In continuation of the previous year's *(1978-79,* pp. 69-70) work, R. S. Bisht of North-western Circle of the Survey, assisted by S. N. Jaiswal, G. S. Gaur, Balbir Singh and R. K. Kaul resumed excavation with a view to ascertaining the cultural sequence of the site.

Period I is characterized by successive floor-levels. The antiquities recovered from the occupational deposit of the period include: terracotta and bone beads and a piece of copper. The pottery (pi. XI A) of this period have been broadly classified into following five fabrics.

Fabric A is represented by a sturdy red ware. Usually treated with thick but fine slip ranging in colour from orange-red to plump-red. The most striking type is a composite form of a bowl (fig. 4) on a stand. The other shapes comprise vases, vessels, carinated cooking vessels, flask, a short stem with a club-base, a knobbed lid and jars.

Fabric B consists of a fine thin red ware mostly slipped and burnished. It is made of fine clay on wheel and the slip varies from brownish red to deep red. The common forms include vessels, vases, a variety of bowls, flasks, carinated cooking vessels with untreated and soot-marked lower body.

Fabric C is a thick ocherous ware, of which a few sherds bear externally incised patterns as well as multiple wavy lines. The shapes include wide-mouthed vessels, vases, etc.

Fabric D comprises two distinct wares, viz., burnished grey ware of thicker quality and ordinary grey ware.

Fabric E is a handmade, ill-fired and crude ware made of poor clay containing stone grits. There is no evidence of painting.

Palaeobotanical investigation established the use and cultivation ot wheat (*Triticum vulgare vill.* and *Triticum Sphaerococcum* perc), barley *(Hordeum vulgare* linn) and rice *(Oryza sative* linn) during the period. The weeds usually associated with the cultivation of wheat and barley were also found. Besides, the presence oi blue pine (Kail) was also confirmed.

Period II is marked by the presence of red ware (fig. 5) associated with the Northern Black Polished Ware. Besides successive floor levels, a rubble-wall is the only structure found from this level (pi. IX B). Noteworthy antiquities include cast copper coins from the upper level.

Period III is represented by a thick deposit consisting of several floors yielding pottery of a thin fabric with bright red or orange slip. Striking shapes are *thali* (pans) and goblets. A small clay seal (pi. XIII A) depicting an Indo-Greek deity was a significant discovery. Coins (pi. XI B) of this period are collected from the surface.

Period IV witnessed the continuation of certain wares and types of the preceeding period. A large number of terracotta figurines (pi. XII), coins and clay sealing (pi. XI C) of this period

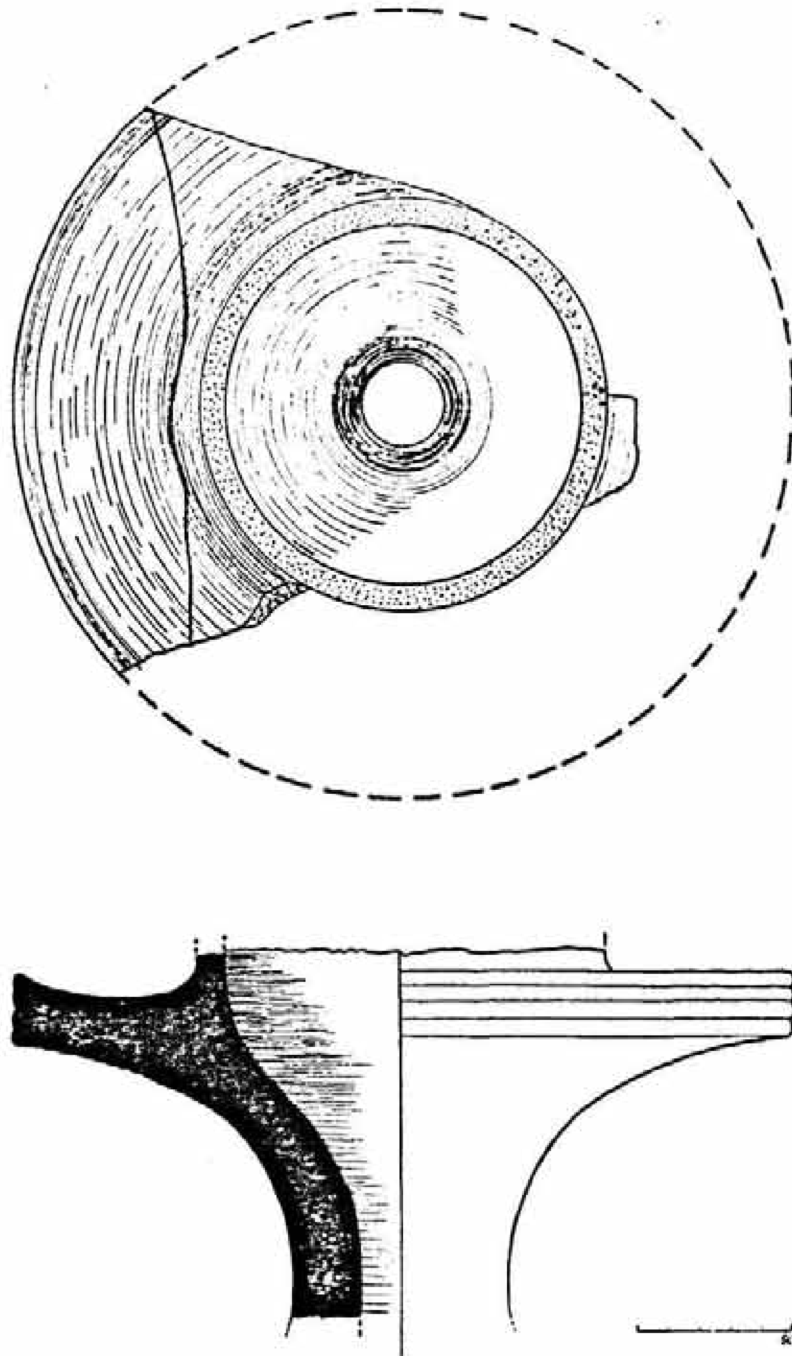


FIG. 4. *Semthan : pottery types, Period I*

arc found from both excavation and surface. The figurines are usually prepared out of a single mould. Other finds comprise beads of terracotta and semiprecious stones in addition to copper and iron objects.

Period V belonged to the time of prolific temple building and flourishing sculptural art in Kashmir.

37. EXPLORATION IN DISTRICTS ANANTANAG, BARAMULLA AND SRINAGAR.—S. N. Rajguru, M. D. Kajale and Kiran Kaul of the Dcccan College Post-graduate and Research Institute, Pune, carried out field investigations and collection of samples of post-Karewa formations of the Late Pleistocene age around Anantanag, Bijbihara, Burzahom, Duru, Pampur and Tamgmarg. Subsequent laboratory works have brought to light following important aspects of the Late Pleistocene formations in the aforesaid area.

(i) These formations are represented by yellowish brown silts and interlayering dark brown clayey silt.

(ii) The thickness varies from place to place and conformably caps the underlying Upper Karewa formations which are of fluviolacustral origin. The thickness of dark bands varies from 0-5 to 1 m at different localities.

(iii) The yellowish brown silt was considered to be of fluvial or aeolian origin and the dark brown clayey bands as palaeosols by the earlier workers. The present observations suggest the possibility of fluvial origin. Non-laminated massive cliffs of silts with *kankar* concretions resemble loess-like deposits. On the other hand, associated dark bands are lenticular and do not show any soil profile development. So it does not appear to be palaeosol.

(iv) Texturally the yellowish brown silts show variation in clay contents from 1 to 38 per cent. High clay content argues against the hypothesis of aeolian origin.

(v) Dark brown bands contain organic carbon varying from 0-1 to 1 per cent and proportion of clay from 25 to 36 per cent. These appear to be clayey silts deposited in stagnant water pools. Presence of dessication cracks in these deposits suggests seasonal drying of pools.

In brief, the studies show that the Late Pleistocene formations in the Kashmir valley are predominantly of fluvial origin and the low energy flood plain environment existed in the major part. Loess-like deposits, therefore, could be of fluvio-aeolian in origin. Neither these deposits nor the associated dark bands resemble the classical aeolian loess and palaeosols of central Europe and North America.

38. EXPLORATION IN DISTRICT JAMMU.—In course of Village-to-Village Survey, K. C. Nauriyal of the North-western Circle of the Survey discovered the following sites.

Site I village	*Approximate extent of mound*	*Cultural assemblage*
Amb (Lat. 32°52' 10" N; Long. 74°47' 30" E)	200 X 200 m	Kushana, Muslim Glazed Ware, medieval sculptures, Muslim coins, commemorative stone slabs, brick temple (AD 1829) and structural remains of late eighteenth century AD
Balowan (Lat. 32°51'4" N; Long. 74°49' 25' E)	150x150 m	Kushana, Muslim Glazed Ware, stone querns, grinders, iron slags and terracotta objects

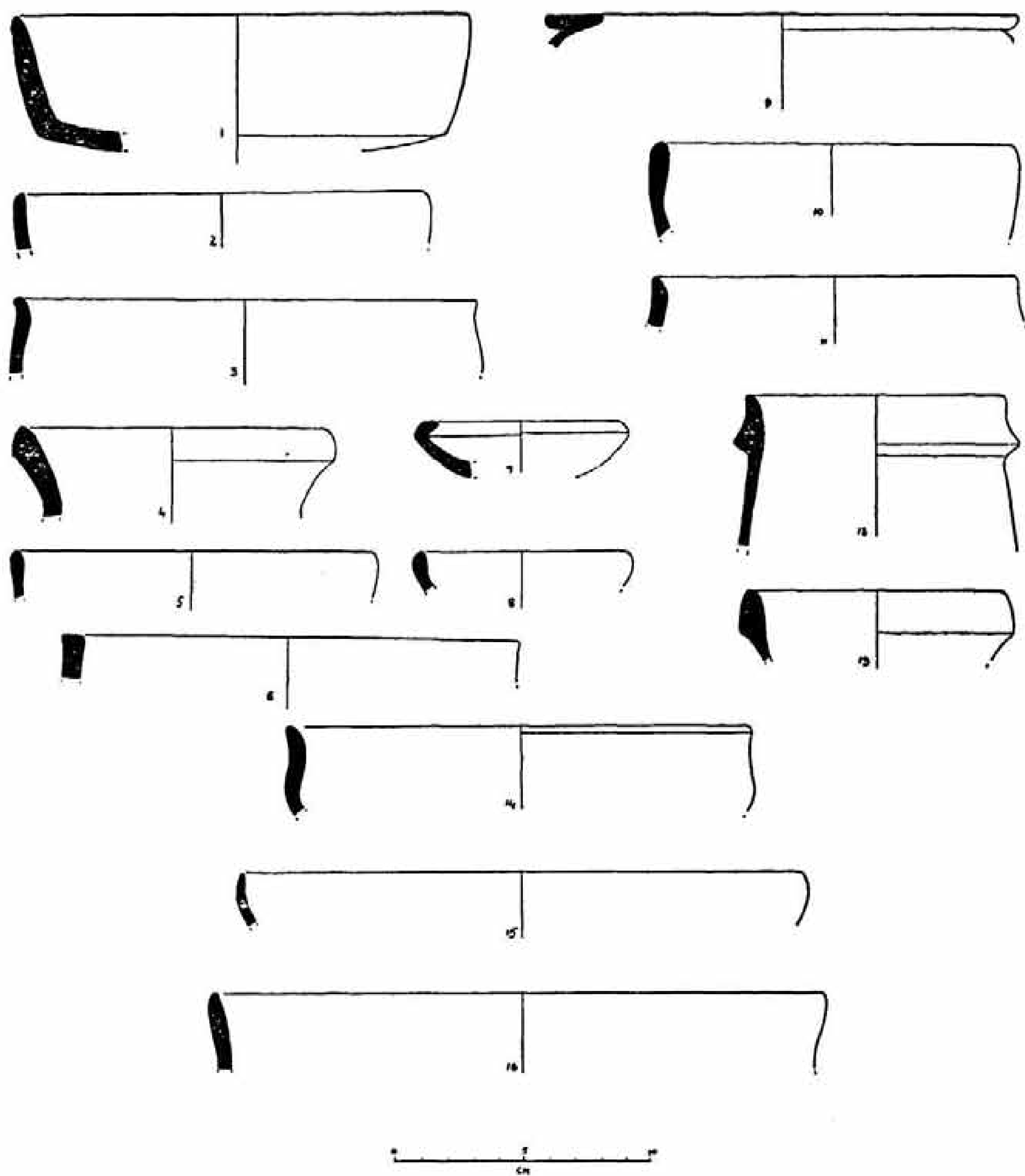


FIG. 5. *Semthan : pottery types, Period II*

Site/village	*Approximate extent of mound*	*Cultural assemblage*
Bhulwal (Lat. 32°50' 18' N; Long. 74°49' 30' E)		Kushana, brick temple (Giri-mats) and platform (medieval)
Chak Bowal (Lat. 32°51' 44' N; Long. 74°48' 25' E)	150 x 150 m	Kushana, Muslim Glazed Ware, terracotta objects, stone querns, grinders and iron slags
Chak Sanga (Lat. 32°54' 6' N; Long. 74°46' 40' E)	100 x 40 m	Kushana
Chhowah (Lat. 32°54' 46' N; Long. 74°50' 10' E)		temple of goddess Nayal Devi (late eighteenth century AD)
Dhanu (Lat. 32°57' 44' N; Long. 74°45' 10' E)	50 x 50 m	Kushana, Muslim Glazed Ware, iron slags, terracotta objects, stone querns and grinders
Dharm Khu (Lat. 32°51'32'N; Long. 74°45' 48' E)	50 x 50 m	Kushana, Muslim Glazed Ware, iron slags, stone querns and grinders
Galali (Lat. 32°56' 12' N; Long. 74°47' 30" E)	100 x 100 m	Kushana, Muslim Glazed Ware, iron slags, stone querns and grinders
Grahi (Lat. 32°54'0'N;) Long. 74°47' 10' E)	200 x 150 m	Kushana, Muslim Glazed Ware, iron slags, stone querns and grinders
Ghaink (Lat. 32°52' 12' N; Long. 74°48' 0' E)	50 x 50 m	Kushana, rectangular platform and image of Hanuman (late medieval)
Ghurota (Lat. 32°51'34'N; Long. 74°46' 55' E)		Kushana, Muslim Glazed Ware, temple and loose sculptures (late eighteenth century AD)
Gorra (Lat. 32°58'30'N; Long. 74°48' 58' E)	50 x 50 m	early medieval, iron slags, stone querns and grinders
Kairi (Lat. 32°56' 18' N; Long. 74°49' 25' E)	150 x 150m	Kushana, iron slags, stone querns and grinders
Kotli Gujran (Lat. 32°54' 48' N; Long. 74°48' 10' E)	50 x 50 m	Kushana
Kotli Panditan (Lat. 32°55' 38' N; Long. 74°47'25' E)	75 x 75 m	Kushana
Kurwanda (Lat. 32°50' 38' N; Long. 74°49'0"E)	100 x 100 m	Kushana, Muslim Glazed Ware, terracotta objects, iron slags and wooden temple (late medieval)

Site/village	*Approximate extent of mound*	*Cultural assemblage*
Marjali (Lat. 32°51' 0" N; Long. 74°45' 40" E)	75 x 50 m	Kushana, iron slags, stone querns and grinders
Nargara (Lat. 32°54' 6" N; Long. 74°5O' 30' E)	75 x 75 m	Kushana, iron slags, stone querns and grinders
Pahta (Lat. 32°53'52'N; Long. 74°5O' 40' E)	75 x 75 m	Kushana
Partara (Lat. 32°52'32'N; Long. 74°46' 30' E)	150 x 50 m	Kushana, terracotta objects, iron slags, stone querns and grinders
Sajwal (Lat. 32°52'0'N: Long. 74°48' 0' E)	120 x 120m	Kushana, Muslim Glazed Ware, terracotta objects, iron slags, stone querns and grinders
Sarot (Lat. 32°54' 4' N; Long. 74°47' 30' E)	100 x 100 m	Kushana, Muslim Glazed Ware, iron slags, stone querns, grinders and temple with commemorative sandstone slabs (late eighteenth century AD)
Seri Panditan (Lat. 32°51' 44" N; Long. 74°49' 30* E)	150 x 70 m	Kushana
That (Lat. 32°52'26'N; Long. 74°46' 0' E)	50 x 50 m	Kushana, iron slags
That Jandial (Lat. 32°53' 43" N; Long. 74°45' 50' E)	100 x 100 m	Kushana, Muslim Glazed Ware, terracotta objects, stone querns, grinders and iron slags

From the foregoing, it appears that though the site of Manda is in close proximity there is no evidence of N B P or the periods preceeding it, including the Harappans, in the area.

KARNATAKA

39. EXCAVATION AT BELGAL, DISTRICT BELLARY.—The Post-graduate Department of Ancient History and Archaeology, Mysore University, carried out a trial excavation at Belgal, about 10 km south-west of Bellary, with a view to ascertaining the cultural sequence of the site. The excavation revealed a cultural deposit varying in thickness from 30 cm to 1 m.

During the excavation it was found that the topmost layer was disturbed and furnished both early historical and Neolithic material. The preceding layer yielded burnished grey and black and red pottery associated with broken pieces of polished tools, hammer stones etc. Underlying this deposit was a floor made up of rammed earth, stone chips and ash mixed with earth. A circular pit and post-holes dug into the natural rock were also noticed over the floor level.

40. EXCAVATION AT HAMPI, DISTRICT BELLARY.-In continuation of the last year's (*1979-80,* p. 33) work, the Mid-southern Circle of the Survey under the direction of

L. K. Srinivasan, assisted by Lai Chand Singh, R. Venkata Siva Sarma and C. B. Patil, resumed excavation in the area behind Kings' Audience hall as well as in the Mint area (fig. 6).
The excavation brought to light plinths and stumps of walls (pl. XIV A) belonging to three or more structural phases (pl. XV A). The earlier two phases were represented by dressed and ornamental ashlar masonry whereas the third one by rubble walls set in mud mortar and plastered with thick coat of lime. The structure of the last phase is characterized by a shrine or porch flanked by pillared halls on cither side (pl. XVI A). It is further flanked by a rectangular and a square pillared hall to the north and south respectively. A small tank and a well were exposed in front of the northern pillared hall.
Remains of a cloistered enclosure belonging to the first phase was encountered in the Mint area near the structure designated as Rang-mahal. The row of cloisters was provided with a pillared corridor in front (pl. XVII). One of the rooms yielded a masonry drain connecting the toilet with a soak-pit at the rear (pl. XV B). The outer wall of the second phase was provided with a revetment of boulders measuring 1.75 x 0.60 m.
A building within the Rang-mahal complex was laid bare having an entrance with a flight of steps towards the north. Its outer wall is embellished with an offset decoration (pls. XIV B-XVI B).

Important antiquities include a terracotta seal with a legend in *Nagari* characters, of the fifteenth century, and a gold ring.

41. EXPLORATION IN DISTRICTS BELGAUM AND DHARVVAR.—S. V. P. Halkatti of the Department of Ancient Indian History and Epigraphy, Karnataka University, Dharwar, in the course of his exploration in Surwanakolla noticed a temple having an *ekatala-vimana* crowned by *sala-sikhara.* There is a beautiful image of Durga perhaps of the times of the Chalukyas of Kalyani. Behind the temple, a miniature shrine contains a *linga* datable to the fifth-sixth century AD.

Further exploration in Vasana revealed a limestone pillar-inscription of *circa* second-third century AD referring to a Satavahana king Vasisthiputra Siri Pulumavi and a certain Chandasiva who bears an appellation Mahadeva. The base of the pillar is embellished with floral designs.

The site yielded also sculptures and architectural members of a temple of the late Rashtrakuta period. Large bricks, tiles, pottery etc. were also noticed.

42. EXPLORATION IN DISTRICT BIJAPUR.—R. S. P. Pappu of the Deccan College Post graduate and Research Institute, Pune, carried out geo-archaeological studies in the lower reaches of the Malaprabha river around Badami town.

Two distinct planation surfaces are observed in the region, one at an elevation between 530-580 m and the other between 610-660 m above Mean Sea Level. Made up of alluvial flat, pediment surface and laterite surface, the lower one is the most conspicuous planation surface in the region. The highest surface is moderately dissected while the lower one is undissected, flat and gently undulating.

Extensive outcrop of laterite was observed in an area of about 15 to 20 sq km around Badami town. The exposed sections and freshly-dug wells revealed that the depth of laterite varies from 20 to 25 m. The laterite is confined to the valley portion (530-580 m) and not found developed as cappings on higher surface (610-660 m). Similar types of laterities were observed in the adjoining Ghataprabha valley, especially around Anagwadi village; the early Pleistocene age has been suggested for this laterite formation on the basis of geomorphic evidence.

The field studies of the alluvial formations in the Malaprabha river and its tributary nalas were made at a number of places. The exposed alluvium is divisible into Older Alluvium and Sub-Recent or Younger Alluvium. The former occurs as discontinuous patches and is made up

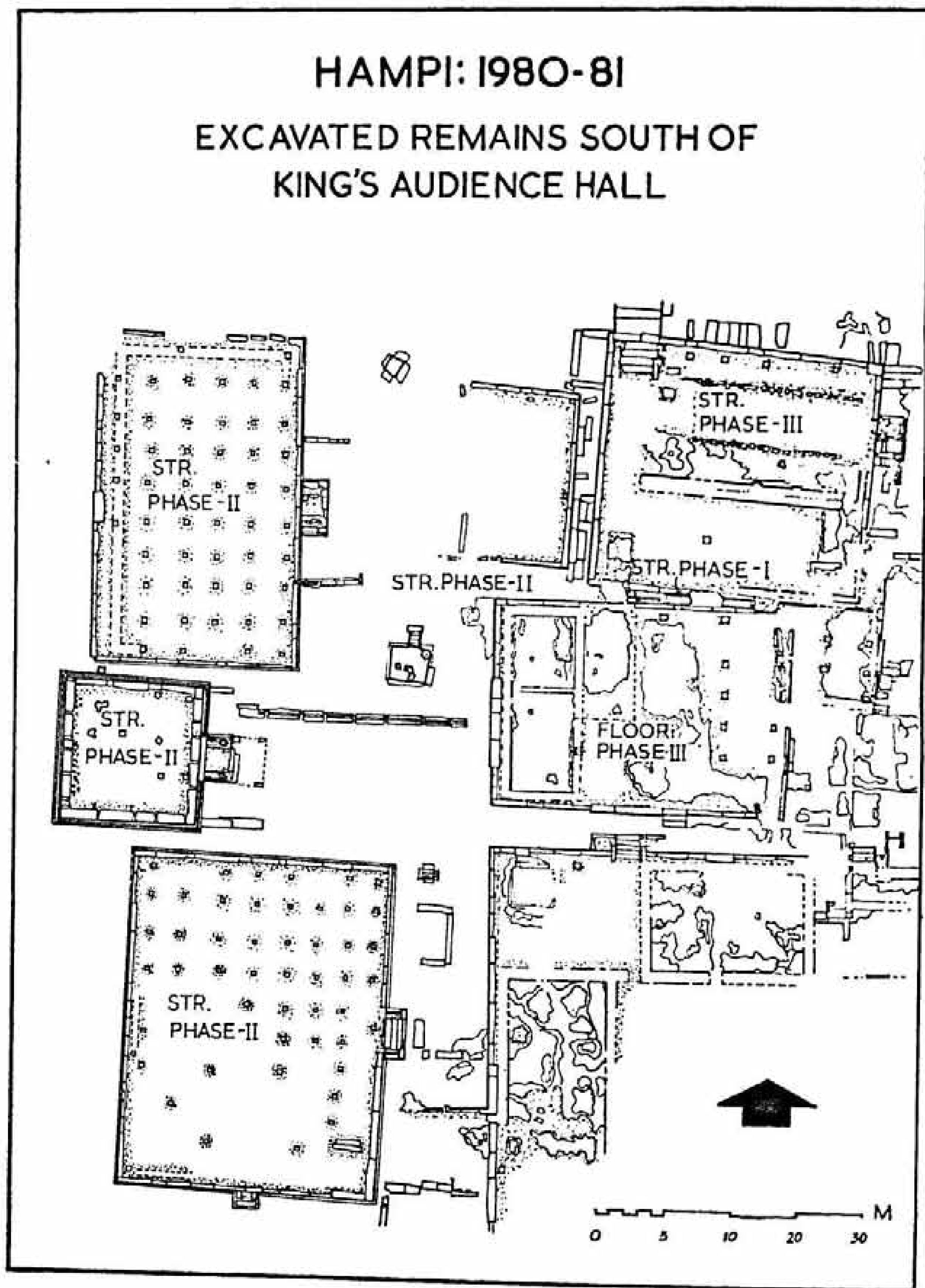

HAMPI: 1980-81
EXCAVATED REMAINS SOUTH OF KING'S AUDIENCE HALL
STR. PHASE-III
STR. PHASE-II
STR. PHASE-I
STR.PHASE-II
STR. PHASE-II
FLOOR PHASE-III
STR. PHASE-II
M
0
5
10
20
30

Fig. 6

of pebbly or sandy gravels and associated *kankary* silts in shades of brown colour. The Younger Alluvium made up of non-*kankary* dark brown silt is found resting against the older deposits and has a widespread distribution in the region.

Palaeolithic sites around Badami are found in two geomorphic situations viz., alluvial sites and surface sites. A number of sites belonging to this category have provided good evidence of Lower Palaeolithic Acheulian industry. The cobbly/pebbly gravels at these sites have yielded tool-kits predominated by finished tools like handaxes, cleavers, etc. A large number of surface sites, lacking stratified geological context, were located in the region. These are confined to pediment surface occurring at an elevation between 550-580 and are situated 3 to 5 km away from the present stream channels. The pediment surface occurring at the foot of Koladgi hills is veneered with angular detritus. The artifacts of Lower Palaeolithic Acheulian industry are found scattered on this pediment surface especially in the foothills at Katarki, Khyad, Kendur, Mahakut and Lakhmapur. These rich Acheulian sites are essentially *in situ* occurring in relatively undisturbed context and represent open-air occupation-cum-factory sites located on the pediment surface in the vicinity of outcrops of preferred raw materials. These sites are littered with finished and unfinished tools besides several cores, flakes and innumerable chips indicating factory debris.

A large number of tools of the Middle Palaeolithic industry were collected as surface finds from modern channel gravels at Cholchgud, Nandikeshwar, Shivyog-mandir and Nagarhal.

A number of natural rock-shelters and caves have developed in the sandstones of Kaladgi series. The natural cave known as Shidalfade near Badami is already well known. These rock-shelters and caves have yielded tools of Mesolithic industry in association with pottery.

A number of Mesolithic sites were located on the plateau occurring at an elevation of 660 m above MSL. The sites are littered with finished and unfinished tools in quite a large number and represent occupation-cum-factory sites.

43. EXCAVATION AT KOMARANAHALLI, DISTRICT CHITRADURGA.—The Department of Archaeology and Museum, Government of Karnataka, carried out excavation with a view to exposing Megalithic burials at the site.

Two types of burials, viz., (i) pit-burials with capstone and cairn-circle i.e. Megaliths I and III and (ii) pit-burials with cairn circle i.e. Megaliths II (pl. XVIII A) and IV have been noticed. Two burials of each type were excavated.

Megaliths I and III are represented by a rectangular pit cut into the laterite rock below the natural soil. Megalith I, however, did not yield any skeletal remains. It yielded spouted vessels, globular pots, pots with pointed base, legged jars, Black-and-red ware bowls along with lipped bowls, conical lids and stand. Iron implements comprise arrowheads, axe, knives, rods etc. Megalith III is characterized by the presence of skeletal remains, pottery comprising small vases of Black-and-red ware bowls and an iron implement. Megalith II is a rectangular pit (pl. XVIII B) with skeletal remains, vases of Black-and-red wares, conical lids with white paintings, a grinding stone and iron implements. Megaliths IV is similar to Megalith II and yielded skeletal remains, Black-and-red pottery, iron implements and stone tools.

The occurrence of white-painted conical lids which were found at Hallur in the Chalcolithic-Iron age overlap phase (*c.* 1000 BC) is an important aspect of the excavation at Komaranahalli which is about 12 km to the east of Hallur.

44. EXPLORATION IN DISTRICT GULBARGA.—In continuation of the last year's (*1979-80,* p. 34) work, K. Paddayya of the Deccan College Post-graduate and Research Institute, Pune, carried out further explorations in the Hunsgi valley in Shorapur Taluk with a view to study the Acheulian and other Stonge Age sites of the area. The following are the Acheulian localities: Benhatti (Locality V), Kupi (Localities IV, V, VI, VII and VIII), Gulbal (Localities VII and

VIII), Malnur (Locality VI), Kannatgi (Locality VI), Wajal (Localities I, II and III), Arikera (Locality IV), Rampur (Locality I), Teggihalli (Locality I), Isampur (Locality I), and Agtirth (Locality I).

These localities are found either along the seasonal streams or in the foothill area of the limestone and shale tableland. The cultural deposit (50 cm in thickness) rests directly on bedrock. It is overlain by about 3-m thick black cotton soil. At a number of localities the soil cover has been removed due to agricultural and other activities, thereby exposing the cultural horizon to surface.

Limestone is the principal raw material of the lithic industry though shale, sandstone and schist were also utilized. The finished tools include: handaxe, cleaver, pick, knife, chopping tool and hammerstone. Waste products occur at almost all the localities. Fossilized bones of *Bos, Ceryus* and *Equus* have been found along with stone artefacts at four localities (Wajal I, Rampur I, Teggihalli I, and Kupi IV). It is for the first time in India that animal fossils forming part of food remains have been found in an occupational context at Achulian sites.

A number of Middle Palaeolithic sites have also been found at Benhatti, Gulbal, Kupi, Malnur, Maralbhavi and Agtirth and Mesolithic sites at Gulbal and Agtirth.

45. EXPLORATION IN DISTRICT SHIMOGA.—Director of Archaeology and Museums, Government of Karnataka, in course of exploration located two Jaina *tirthankara* sculptures, two *chamara*-bearers and two fragmentary *simhasanas* (seats), datable to the tenth-eleventh century AD at Basavaptna.

46. EXPLORATION IN DISTRICTS SHIMOGA, CHIKMAGALUR AND HASSAN.—K. P. Poonacha, Research Scholar of the Department of Ancient Indian History and Epigraphy, Karnatak University, Dharwar, in the course of his exploration in the Tungabhadra, the Tunga, the Bhadra, the Kaveri, the Hemavati and the Kumudwati valleys, discovered Early Stone Age tools in these river beds at Pilangere, Vaderpura and Shankaragatta (Bhadravati Taluk), Sudur (Hosanagara Taluk) in District Shimoga, Sompura (Tarikere Taluk), Balehonnur, Agrahara, Lakyajayanti-grand and Nidaghatta (Sakrepatna Taluk) and Bankal (Mudigere Taluk) in District Chikmagalur, Ramnathapura, Kattepura, Basavana Halli and Rudrapatna (Arkalgud Taluk), Ramagatta (Hassan Taluk), Mudala Hippe and Kattebelguli (Holenarasipura Taluk) Benkekere (Arasikere Taluk) in District Hassan. The tools made on quartz pebbles are heavily rolled and are essentially core tools comprising handaxes in the largest number, followed by choppers, discoids and flakes, mostly in Abbevellio-Acheulian and Acheulian stage.

Tools, representing transitional stage from Late Acheulian to Middle Stone Age, collected in mint condition from the cemented bed at Kattebelguli throw much light on the prepared core technique.

Middle Stone Age sites are located at Haraganahalli (Honnali Taluk) in District Shimoga and Kattebelguli and Kattehosalli (H. N. Pura Taluk) and Cholenahalli (Channarayapatna Taluk) in District Hassan; the tool assemblage comprising varieties of scrapers, points, awls and cores are made on quartz and heametite flakes. The occurrence of a fossil bone along with Middle Stone Age tools at Kattehosalli is noteworthy.

Late Stone Age Sites are discovered at Nyamati and Surahonne Harlehalli (Honnali Taluk), Sasivehalli and Chikbasur (Bhadravati Taluk), Salabalu (Shimoga Taluk) and Nilaskal (Hosanagara Taluk) in District Shimoga, Kadur and Gedlahalli (Kadur Taluk) in District Chikmagalur, Ramagattu (Hassan Taluk), Kettebelguli (H. N. Pura Taluk), Malavanagatta, Shettihalli and Cholenahalli (Channarayapatna Taluk), Chikkatarevala and Halekal Gudda (Arasikere Taluk), Kattepura, Basavanahalli and Ramanathapura (Arkalgud Taluk) in District Hassan. Most of them are factory sites, having mostly non-geometrical tools made on quartz.

The sites noticed at Sasivchalli (Honnali Taluk), Naga Samudra (Bhadravati Taluk), Holehatti and Holebenavalli (Shimoga Taluk) in District Shimoga have Neolithic, Megalithic and historical cultural remains. Neolithic pottery in the above sites include brown-and-black and black wares.

Megalithic burial sites with dolmenoid cist-circles and pit-circles were noticed at Kaduvinahosalli, Shigodu, Sompura and Ullcnahalli (Arkalgud Taluk), Honnavara, Pungame and Kondajji (Hassan Taluk) in District Hassan while menhirs were noticed at Haraganahalli and Belimallur (Honnali Taluk) in District Shimoga, Kenchapura (Tarikere Taluk) in District Chikmagalur, Halekal Gudda (Arasikere Taluk), Pratapakumari Nagara (Hassan Taluk), Mulekalcna Halli (Hole Narasipura Taluk) and Hosalli (Arkalgud Taluk) in District Hassan.

Temples of the Hoysala period at Maligenahalli (Shimoga Taluk) in District Shimoga, Somapura (Tarikere taluk), Pillenahalli (Kadur Taluk), Hiremagalur (Chikmagalur Taluk) in Chikmagalur District, Cholenahalli (H. N. Pura Taluk), Honnavara and Shantigrama (Hassan Taluk), Saraguru (Arkalgud Taluk) in District Hassan worth special mention. Temples of Nayaka period were noticed at Ramanathapura (Arkalgud Taluk) in District Hassan, Khandya (N. R. Pura Taluk), Pillenahalli (Kadur Taluk), Balehole and Haluvalli (Kalasa Taluk) in District Chikmagalur. At Gavatur in Hosangara Taluk of District Shimoga, a small temple, built of laterite blocks with a conical *sikhara,* is noticed. Dilapidated medieval forts of stone blocks and rubble were noticed at Kunchenahalli (Shimoga Taluk) in District Shimoga and Konanur (Arkalgud Taluk) in District Hassan.

47. EXCAVATION IN DISTRICT SOUTH KANARA.—P. Rajendran of the Department of Archaeology, Deccan College, Pune, during the course of his exploration along the river Netravati located two Mesolithic sites at Uppinangadi and Mani, The tools comprise various types of scrapers, blades, bores, burines, lunates, flakes and cores. The artefacts from Uppinangadi were found in a stratified context on a gravel bed. Some of the artefacts show evidences of fluted core technique, besides retouching. Along with the implements, a semi-fossilized tooth of *Bos* sp., has been found at Uppinagadi. At Mani the implements are found on a laterite surface. These industries show close similarities with other Mesolithic industries reported from Konkan and Ratnagiri regions, Karnataka, Kerala and Tamil Nadu.

KERALA

48. EXPLORATION IN DISTRICT KOZHIKODE.—Raman Numboodiri of the Southern Circle of the Survey carried out exploration in the Western Ghats and brought to light a three-chambered megalithic burial in the lateritic region at a place called Urath in the village Kuttiady. The capstones were found missing.

49. EXPLORATION IN DISTRICT MALAPURAM.—Raman Numboodiri of the Southern Circle of the Survey during the course of exploration located a ruined temple in Karulayil Range of Nilambur reserve forest. Further, a megalithic menhir in granite was also noticed in the area.

MADHYA PRADESH

50. EXPLORATION IN DISTRICT BALAGHAT.—V. D. Misra and B. B. Misra of the Department of Ancient Indian History Culture and Archaeology, University of Allahabad and J. D. Clark of the California University, Berkeley, USA, carried out exploration on the outskirt of the Kanha park overlooking the Banjar valley and discovered a site at Bamni-Dadar yielding microliths comprising retouched blades, scrapers, lunates and triangles fashioned mainly on chalcedony.

51. EXPLORATION IN DISTRICT BASTAR.—In continuation of last year's *(1979-80,* pp. 39-41) work Zarine M. Copper, of the Department of Archaeology, Deccan College, Pune, carried out

exploration in the area around Chitrakot Falls and village Michanar with a view (i) to obtaining specimens of plants used by the local tribals for food, fishing, medicinal use and construction and (ii) to finding out additional archaeological evidences for human occupation.

(i) Twenty plant specimens were collected and all of them arc common to areas of dry deciduous vegetation. Out of these collections, four plant species were used for food, two for medicinal purposes, one for poisoning fish, and thirteen for construction work.

(ii) Four new open-air Mesolithic factory sites were discovered along the Modko nullah joining the river Indravati in a roughly northeast-southwest direction and that joins it at a point about 4 km to the east of Chitrakot Falls. This brings the total number of similar open-air stations in this 72 sq km area to fortv-nine, with an average of more than one site per square km. In addition to the high density of sites, their sizes, which van' from a few square to over 20,000 sq m, suggest the existence of a large human population in this area during the Mesolithic times.

The Modko stream cuts through the shale, sandstone and quartzite rocks of the Cuddanah series. Three of the four newly-discovered sites MDK 1, MDK 2 and MDK 3 arc situated on the western bank whi'e MDK 4 is on the eastern bank. The sites arc located on the highest points. Quartz and chert constitute the basic raw materials for the artefacts; the quantity of debitage predominates over that of finished artefacts, this being a common factor that links all the forty-nine sites in this area.

The survey around Michanar covering an area about 100 sq km (between 19°-19^{3}6' N and 81°40'-81^{c}45 E) yielded five caves and thirty-four rock-shelters, which may be divided into three groups: the Maerar Pakna series with four caves and twenty-two shelters; the Dhodra Konta group having nine shelters; and the Jam Jharia group having one cave and three shelters. The largest of the caves is approximately 30 sq m in area and the smallest 4 sq m. No habitational deposit was encountered.

Examination of various sections of the seven nullahs revealed four layers consisting of slope deposits, though all of them are rarely represented together in one section. The topmost deposit consists of yellowish brown sandy soil. The second one, comprising bouldery gravel, yielded handaxes and flakes of quartzite. Layers 3 and 4 represent sandy clay and loam.

52. EXCAVATION AT KHAJURAHO, DISTRICT CHHATTARPUR.—The Central Circle of the Survey under D. K. Sinha assisted by S. A. Sali, M. U. Rao, V. N. Peshwani, V. P. Verma, J. Prasad, V. S. Vyas and D. K. Lokhande carried out excavations (pl. XIX A) at Khajuraho with a view to exposing the remains of structures.

Excavations at the largest mound (65 m x 40 m), situated about a kilometre to the east of the western group of temples, yielded the remains of a wall perhaps the *prakara* of the temple, built of undressed boulders of quartzite. On the top of the mound to the north-east was exposed a ruined shrine with a flight of steps on the east, apart from a brick-built courtyard (pl. XIX B). Similar burnt brick platform was encountered in the mid-level of the mound; a *makara-mukha pranala* was found near by. Important finds include sandstone sculpture of Uma-Mahesvara, beads of terracotta, agate and carnelian, a few pieces of copper rings, carved stones and pillar fragments.

53. EXCAVATION AT PAGARA, DISTRICT DHAR.—V. K. Bajpai assisted by D. K. Mahashabde and N. K. Pathak of the Department of Archaeology and Museums, Government of Madhya Pradesh, carried out a trial excavation at the site after getting the news of of the discovery of gold and silver coins respectively belonging to Gupta and Kshatrapa rulers. Three cultural periods beginning from the Christian era to the twelfth century were recognized in the excavation.

Period I (first to third century AD) is marked by abundance of red ware represented by conical bowls, sprinklers, medium-size pots, carinated vessels and basins. About 15 to 20 per cent of red ware was treated with bright red slip. A few sherds of black-and-red and black ware were found associated with it.

Period II (fourth to sixth century) is characterized by the presence of shell-bangle, beads, terracotta figurine, wheel, flesh-rubber, gold piece and carved soapstone fragments. There is no appreciable change in the ceramic industry of the period except the presence of miniature pots of black ware.

Period III (seventh to twelfth century) is marked by the presence of iron and copper objects along with early and late medieval pottery, mostly represented by grey ware.

54. EXPLORATION IN DISTRICT DEWAS.—In continuation of last year's *(1979-80,* pp. 41-42) work M. Uma Mahcswara Rao of the Central Circle of the Survey undertook further exploration along the bank of the river Choti Kalisindh and its tributaries. The following is the list of villages/sites with antiquarian remains.

Taluk	*Village/site*	*Cultural assemblage*
Sonkachh	Barkheri	medieval mound with red ware and sculptures
-do-	Bhaturi	medieval mound with red ware, black ware and sculptures
-do-	Kaneria	remains of a medieval temple and sati-pillars.
-do-	Karavia	medieval sculptures and sati-pillars
-do-	Parlia	medieval mound with red ware and *sati*-pillar

55. EXPLORATION IN DISTRICT MANDLA.—V. D. Misra and B. B. Misra of the Department of Ancient Indian History, Culture and Archaeology, University of Allahabad and J. D. Clark, of the California University, Bekeley, U.S.A., in course of visit to the famous wild life sanctury of Kanha explored Kesli and Mundi-Dadar. Kesli yielded Middle Palaeolithic tools consisting of scrapers, blade, point, borer, along with core and flake, while antiquarian remains at Mundi-Dadar are characterized by the presence of Mesolithic assemblage which includes blades, scrapers, points, lunates fashioned mainly on chalcedony.

56. EXPLORATION IN DISTRICT MORENA.—In continuation of the last year's (*1979-80,* pp. 42-44) work Krishnapal Singh Bhadoria of the Central Circle of the Survey explored along the banks of rivers Azan and Kunwari and brought to light the following sites yielding antiquarian remains. The occurrence of Kayatha Ware at Basaiya, Gilolikhera and Hurhai indicates its spread further north.

Taluk	*Village/site*	*Cultural assemblage*
Ambah	Ambah	medieval ruined *garhi* and fragmentary Brahmanical sculptures
,,	Dohra	medieval fragmentary Brahmanical sculptures and architectural fragments

Taluk	*Village/site*	*Cultural assemblage*
Ambah	Itora	historical mound with pottery medieval
	Khariyahar	fragmentary Brahmanical sculp-tures and architectural fragments and late medieval sati-pillar
	Porsa	medieval fragmentary Brahmanical sculp-tures and architectural fragments and mound
	Ranipura	historical pottery historical mound with
"'	Ruar	pottery medieval fragmentary Brahmanical
Morena	Bani	sculp-tures, architectural fragments and memorial pillar medieval fragmentary Brahmanical sculp-
	Bareh	tures mound with chalcolithic Kayatha Ware and
	Basaiya	historical pottery historical mound with pottery historical mound with pottery and
"JJ	Bhonderi	medieval fragmentary Brahmanical
JJ	Bijolipura	sculptures and architectural fragments mound with chalcolithic and historical pottery and medieval Brahmanical sculp-
	Chhaunda	tures and architectural fragments medieval fragmentary Brahmanical sculptures, architectural fragments and a *salt*-pillar
	Churcla	medieval fragmentary Brahmanical sculp-tures and a memorial pillar mound with chalcolithic Kayatha Ware. Painted Grey
JJ	Deori	Ware, Northern Black Polished Ware and a terracotta mound with Kayatha Ware and
?>	Gilolikhera	historical pottery medieval fragmentary Brahmanical sculp-tures
99	Hurhai*	historical mound with pottery late medieval ruined *garhi* and *sati*-pillar medieval pottery
99	Imliya	and *sati*-pillar historical mound with pottery and medieval fragmentary Brahmanical
)>	Jarara	sculptures mound with chalcolithic black-
J>		and-red ware, painted grey ware, historical
JJ	Karhari	pottery, ring-well and other minor
)>	Kheramevda	antiquities, fragmentary medieval sculptures
	Kotwal (Kutwar)	

♦Asterisks indicates place not occurring in toposheets.

Taluk	*Village/site*	*Cultural assemblage*
Morena	Lolakpur	medieval pottery and fragmentary Brahmanical sculptures
Morena	Mirghan	medieval fragmentary Brahmanical sculptures and architectural fragments
	Mudiakhcra	medieval fragmentary Brahmanical sculp-tures
M	Nibi	mound with chalcolithic black-and-red ware, Painted Grey Ware and Northern Black Polished Ware
J»	Parichha	ruined *garhi* and *devalaya* belonging to the Maratha period
>>	Piparsa	historical mound with pottery
5J	Rapatkapura*	historical mound with pottery and medieval fragmentary Jaina sculptures

57. EXPLORATION IN DISTRICT RAISEN.—Dharam Pal of the Central Circle of the Survey in course of the Village-to-Village Survey discovered the following sites in the Raisen Taluk of District Raisen.

Village/site	*Cultural assemblage*
Alipur	Late Stone Age tools, Brahmanical sculptures of medieval period and *sati-pillar*
Amba	medieval sculptures and *sati*-pillars
Amrawad Bramad	sculptures of the Paramara period
Andol	Late Stone Age tools, medieval sculpture and *sati*--pillars
Bagod	medieval sculptures and *sati--pillars*
Bamhosi	microliths, medieval sculptures and *sati*--pillar
Bangawan	microliths, rock-shelters painted in red and white colours, medieval sculptures and two historical mounds
Bankheri	medieval sculptures and *sati*--pillars
Baroda	medieval sculptures of the Paramara period and *sati*--pillars
Bawalia	Late Stone Age tools, painted rock shelters and *sati*--pillars
Bhadner	remains of a temple and sculptures of the Paramara period
Claroli	Late Stone Age tools, medieval sculptures and *sati*--pillars
Dahar	medieval sculptures and *sati*--pillars
Dandcra	Late Stone Age tools
Dhaniakhcri	medieval sculptures and *sati*--pillars
Ghatla	Early and Late Stone Age tools, remains of medieval stone structures
Hakimkheri	remains of stupas and monasteries
Karhaia	medieval sculptures and *sati*--pillars

Village/site	*Cultural assemblage*
Karmodia	Late Stone Age tools, painted rock-shelters, medieval sculptures and *sati*--pillars
Kataria	red ware and black ware from the historical mound, and medieval structures
Khanpur	Early and Late Stone Age tools, red ware and black ware from the historical mound
Kotra	medieval structural remains and sculptures, *sati*--pillars
Makhani	medieval sculptures and *sati*--pillars
Manpathrai	medieval sculptures and *sati*--pillars
Maser	medieval sculptures and *sati*--pillars
Mugalia	medieval sculptures and *sati*--pillars
Parwaria	medieval sculptures and *sati*-pillars
Pathari	sculptures and architectural fragments of the Gupta period and medieval *sati*--pillars
Pemat	remains of a temple and sculptures of the Paramara period
Pengawan*	Early and Late Stone Age tools and painted rock-shelters
Ratanpur	historical mound and pottery
Sanchar	remains of temples, monasteries, *baoli,* inscription, sculptures and *sati*--pillars of medieval period
Sojna	medieval sculptures
Sonkachh	historical mound and pottery
Urdain	Late Stone Age tools and painted rock-shelter
Vyora*	Late Stone Age tools, rock-shelters painted with red and white

The tools of Early Stone Age made out of quartz or Vindhyan sandstone include: chopper, scraper, handaxe and cleaver. The Late Stone Age tools comprise blade, scraper and burin. The paintings in rock-shelters depict dancing, hunting and war scenes executed in red ochre and white. In some of the rock-shelters many layers of paintings are seen superimposed one over the other, specially at Urdain. Noteworthy among the sculptures noticed during the exploration are Naga-Nagi, of the early Gupta period, from Pathari, Uma-Mahesvara and female attendants, of the Paramara period, from Bhadner and Lakshmi and Ganesa of the Paramara period, from Baroda.

58. EXPLORATION IN DISTRICTS RAISEN AND SEHORE.—S. S. Gupta, A. J. Nambiraju, J. S. Dubey, B. R. Rajput, K. S. Venkatramiah and P. Biswas led by A. K. Sharma under the guidance of K. D. Banerjee of the Prehistory Branch of the Survey studied the rock paintings at Bhimbetka with a view to establishing the chronology.

The paintings, in almost all the shelters, are of animals (wild as well as domestic) and human beings done in different shades of red, white, green and black. Human beings are shown with sword and shield, bow and arrow, spear, dagger, battle-axe and stick. Floral designs, geometrical patterns, Brahmi scripts including *sankha-lipis* are also found (pl. XX). Figures of different colours are found to have been superimposed upon each other. The depiction of human figures over the Gupta-Brahmi inscription is a noteworthy feature. Figures are drawn in dark red while inscriptions seem to have been stencilled in cream colour pigment.

Three painted rock-shelters have been discovered in the mid-ghat (22 29' N; 77°39'E) in District Schore, depicting human figures with sword and shield, bow and arrow, *kanwar* and hanging pots. These arc painted in white and Indian red colour (burnt sienna), while some others are in yellow ochre with outlines in Indian red colour pigment.

A huge complex of Siva temple, in ruins, has been noticed near Ginnurgarh fort (22°50'N; 77°30' E). Besides the remnants of the temple, a subsidiary shrines and ruins of residential complex have also been noticed.

59. EXCAVATION AT NANDUR, DISTRICT RAISEN.—The Department of Ancient Indian History and Archaeology, University of Sagar, and the Directorate of Archaeology and Museums, Government of Madhya Pradesh respectively under S. K. Pandey and M. D. Khare, assisted by N. P. Dube, C. Krishna, G. P. Misra, S. K. Soni and L. P. Kadam, carried out excavation at Nandur on the river Betravati, 12 km south-west of Mandideep, between Bhopal and Itarsi junction. Two trenches—NDR 1 and NDR II—were dug (pl. XXI A-B) at Nandur, which may be identified with Nandipur of Sanchi inscriptions. Apart from its situation on the ancient trade route from Kausambi to Nasik, the discovery of two rock-edicts of Asoka, about 15 km from the site, close proximity of rock-shelters and location of a few chalcolithic sites and medieval temples led to ascertain the cultural sequence of the site. The excavation yielded the following sequence (fig. 7).

Period I A (*circa* fifth-fourth century BC) is characterized by wheel-made pottery represented by deep and thin bowls in black-and-red ware, besides a few black ware bowls of fine fabric.

Period I B (*circa* fourth to third century BC) indicates the use of red, black-and-red and black-slipped wares in addition to wares associated with the Northern Black Polished Ware. However, the excavation did not yield any N.B.P. sherds. Important antiquities include cast and punch-marked coins, one carnelian bead, bone stylus, copper antimony rod and a terracotta human figurine.

Period II (*circa* second century BC to first century AD) shows the continuity of the earlier ceramic tradition along with the introduction of new types like lid-cum-bowl and wide-mouthed basins. Other finds include copper coins, shell and terracotta bangles, terracotta beads and iron objects.

Period III (*circa* first century to fourth century AD) is marked by the presence of painted and stamped pottery and some inscribed seals belonging to the Kushana-Kshatrapa times.

Period IV (*circa* fourth century to sixth century AD) yielded grey ware pottery, seals and sealings bearing variously inscriptions like *Visaya, Vishadhi Karnasya,* and *Mahadandanayaka Parnaka Kishkindhaka* (pl. XXI C).

60. EXCAVATION AT AMAHATA, DISTRICT REWA.—G. R. Sharma, assisted by V. D. Misra, B. B. Misra, Ranjit Singh and Kamalakar of the Department of Ancient Indian History, Culture and Archaeology, University of Allahabad, carried out excavation at Amahata (lat. 24°37' 15" N; long. 32°13' 45" E), about 93 km to the east of Rewa. Explorations yielded as many as two hundred megaliths (pl. XXII A) represented by cairn-circles and cists. The evidence of habitational site was also traced to the north of the burial site.

With a view to ascertaining the method of construction of burials and nature of grave goods one of the cists, designated as Cist 1, was excavated, as a result of which four orthostats along with a partially-broken capstone were brought to light (pl. XXII B). The longer axis lies east-west. Burial goods include pottery, microliths and a piece of ochre along with iron nodules. On the floor, stone pieces were placed enclosing the burial goods. No floor-stone or port-hole was provided in the cist having the longer axis oriented east-west.

The corresponding habitation site yielded pottery and microliths, apart from the discovery

of a plan of a circular structure along with its a floor. Antiquities include glass bangles, beads of semiprecious stones and burnt clay-lumps with reed and bamboo impressions.

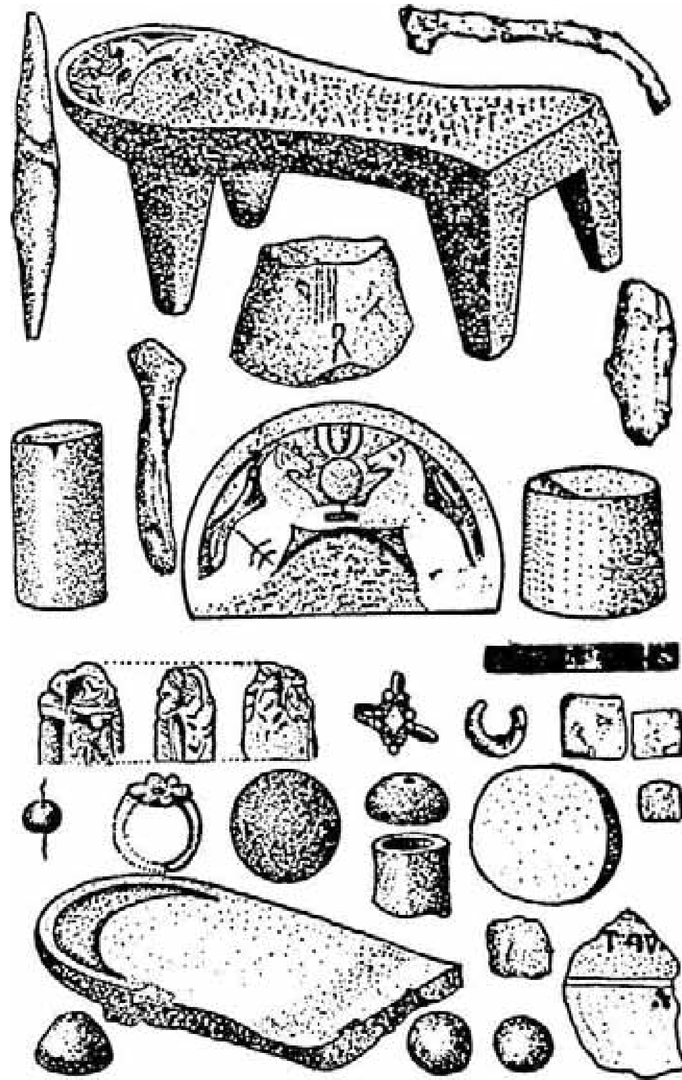


FIG. 7. *Nandur : antiquities*

61. EXCAVATION AT MUNHAI, DISTRICT REWA.—G. R. Sharma, assisted by V. D. Misra, B. B. Misra, Ranjit Singh and Kamalakar of the Department of Ancient Indian History, Culture and Archaeology, University of Allahabad, carried out excavation at Munhai (lat. 24°37' 30' N; long. 82° 13' 15" E) on the left bank of the river Adwa, about 95-75 km south-east of Rewa, with a view to ascertaining the nature and character of the megalithic burials (pl. XXIII A) spread over an area of 700 x 400 m and corresponding habitation area. For this purpose two cairn-circles, designated as Megaliths I and II, were opened (pl. XXIII B), out of the total number of thirty-five. Further, in order to correlate them with the habitational deposit two trenches were also excavated.

Megalith I was an oblong pit with an east-west orientation. The pit dug into the natural soil had its uneven bottom levelled by a cushion of red sandy soil. The burial goods include a

few fragmentery bones and sherds of red ware. Megalith II, similar to Megalith I, yielded potsherds of red, grey/black wares along with animal bones.

Excavation in the habitational area brought to light 0.4 m deposit divisible into four layers, the earliest of which (layer 4) is represented by transitional phase from the chalcolithic to Iron Age. The pottery of Phase I consisted of red, black-and-red and black-slipped wares, along with red, thick sturdy grey/black wares. Other antiquities recovered include a few microliths on chalcedony, fragments of querns and mullers, burnt clay-lumps, few copper pieces, glass bangles and iron fragments. Other three upper layers constituting Phase II yielded sturdy well-baked red ware, black/grey ware and black-and-red ware. Noteworthy shapes are shallow bowls or dishes with disc base, straight or convex-sided bowls, basins with externally-thickened and grooved rim, concave-sided vases, carinated vessels, spouted vases and miniature and small vases. Important antiquities include glass bangles, bead of semiprecious stones, iron and copper objects, iron slags, animal bones, burnt clay-lumps and fragments of quern and muller.

62. EXPLORATION IN DISTRICT SAGAR.—In course of exploration Vijay Singh of the Department of Archaeology, Deccan College, Pune, discovered as many as six painted rock-shelters at Hapsili, Pagara, Pandow, Patricota, Patharia and Semra.

Most of the shelters bear paintings in red and ochre colour depicting scenes of fighters and warriors carrying swords and shields, bows and arrows, and male and female figures in dancing pose. Painted scenes also depict the figures of wild buffalos, lions and *chitahs,* besides horses and elephants.

63. EXCAVATION AT RUNIJA, DISTRICT UJJAIN.—With a view to ascertain the cultural sequence and the extent of the chalcolithic culture, and details concerning the Gupta period, excavation was carried out jointly by the Vikram University, Ujjain and Directorate of Archaeology and Museum, Madhya Pradesh, under the direction of V. S. Wakankar and M. D. Khare, assisted by S. K. Arya, J. N. Dubey, Giriraj Kumar, Raja Ram Singh, Mohan Kumar Maheshwari and Bharati Joshi. It revealed the following five-fold cultural sequence as a result of excavation in three trenches RNJ 1, RNJ II and RNJ III.

Period I A is represented by chalcolithic pottery (pl. XXIV A) of Ahar types consisting of red, grey and black-and-red with white-painted parallel bands and incised designs; dish-on-stand and dishes with ring base are the notable shapes of this phase. Period I B is characterized by the introduction of a new ware with paintings in red as well as black over its matt surface termed as Runija ware (pl. XXIV B and C). While designs repertoire consists of loops, criss-cross patterns, scorpion, fish, snake, sun, diamond etc., most of the shapes of the earlier phase continued to occur in this phase. Terracotta figurines of mother goddess were also reported from this sub-period. A huge mud wall with very thick wooden beams and thick mud roof has been noticed in the upper levels. This sub-period came to an end as a result of a large-scale conflagration. Periods II A and B are marked by the introduction of iron, cast and punch-marked coins along with early historical pottery. Period II B also yielded glass bangle and ivory beads. Period III is assignable to the Sunga-Satavahana period. Period IV, marked by the occurrence of a Kshatrapa coin of Rudrasena and painted pottery, is ascribable to the Kushana-Kshatrapa period. Other antiquities include ivory and shell bangles, beads of semiprecious stones and iron objects. Period V yielded a large number of antiquities such as terracotta figurines, gold coins, beads of semiprecious stones assignable to the Gupta period.

MAHARASHTRA

64. EXCAVATION AT DAULATABAD, DISTRICT AURANGABAD.—A part from the intensive survey of the ruins of the township of Daulatabad, a small-scale excavation was undertaken at

the north-west corner of the locality by M. S. Mate of the Deccan College, Pune and T. V. Pathy, of the Marathawada University, Aurangabad, assisted by R. S. Morwanchikar, R. B. Sapre, Bheumal and Pimpare. It exposed to view an extensive mansion of the fifteenth century AD, built of stone and plastered with very fine lime, extant at places. A number of rooms were laid around the northern and eastern sides of the enclosed courtyard that had its entrance to the west and a brick-lined well/storage tank on the south (pl. XXV A). The entire mansion received the supply of fresh water through underground terracotta pipes set in mortar. It also revealed a small brick tank with distributaries fed by the water of the mains. Small finds include pieces of Celadon Ware, locally glazed ware and a thin red ware, the last-mentioned pottery not usually associated with the medieval sites of the Deccan.

65. EXCAVATION AT NAGRA, DISTRICT BHANDARA.—In continuation of the last year's (*1979-80,* p. 56) work the Department of Archaeology and Museums, Government of Maharashtra, under the direction of A. P. Jamkhedkar assisted by P. M. Mulay and K. D. Kawadkar, resumed excavation at the site.

The excavation revealed a rectangular brick temple, measuring 40 x 27 m, with an extant, height of 3 m and datable to the Vakataka period. The vertical facing of the basement is embellished with ornamental mouldings, recessed and projected niches. The pottery is characterized by the presence of sprinklers, lamps and other wares of everyday use.

66. EXPLORATION IN DISTRICT DHULIA.—S. N. Raghunath and L. S. Rao of the South western Circle of the Survey in the course of exploration at village Methi collected the sherds of the late Harappan and the Malwa Wares bearing paintings. The site also yielded parallel-sided blades and fluted cores on agate and chalcedony. They also collected from the village Alara the sherds of Jorwe Ware, thick red ware of the late Harappan type and microlithic tools like points besides a few cores, all made on agate and chalcedony. The village Kholaj, in Sindhakhed Taluk, also yielded sherds of late Harappan and black-and-red ware with paintings in white pigment on the interior and graffiti on the exterior. Late Harappan ware comprises storage jar, basin, high-necked jar and carinated bowl in black and red ware. Further, at Kurkawada L. S. Rao discovered Jorwe Ware sherds, besides cores and flake-tools, made on chalcedony and jasper.

67. EXCAVATION AT BOREGAON, DISTRICT NAGPUR.—The Department of Archaeology and Museums, Maharashtra and the Deccan College Post-graduate and Research Institute, Pune, under S. B. Deo and A. P. Jamkhedkar assisted by P. M. Mulay, R. K. Mohunty, C. G. Padwall, G. B. Deglurkar and P. K. Thomas carried out excavation at Boregaon (78°55' and 21°20') 42 km north-east of Nagpur. Forty-eight stone-circles were located with diameters ranging between 19.5 and 5.00 m.

Five megalithis were excavated which yielded the Black-and-red Ware, black burnished ware and micaceous red ware. Of these, Megalith 36 yielded a few human teeth and iron sickles, chisels and adzes as also a copper dish with a lid having on its knob a peacock motif. Megalith 3 is marked by a huge trough (pl.XXV B), cut out of a huge boulder, placed right in the centre of the stone-circle. Besides pottery, a skeleton of a young horse, human teeth, ear-rings of gold and muller stone were exposed. Megalith 35 yielded a number of iron objects (pl. XXV C) like arrowheads, tridents, legged querns, horse bits, nail parers and axes along with copper bangles, dishes and three hundred etched and non-etched beads of agate and carnelian.

68. EXPLORATION IN DISTRICT OSMANABAD.—As a part of the problem-oriented exploration, S. N. Raghunath of the South-western Circle of the Survey noticed chalcolithic pottery at Malkhed, neolithic rock-bruising at Yeragola and the Late Stone Age tools

at Kunchur in the Bhima river valley. These apart, he picked up a sherd of late Harappan pottery on the bank of the river Tirana at Ter.

69. EXCAVATION AT INAMOAON, DISTRICT PUNE.—In continuation of the last year's (*1979-80,* pp. 58-59) work, M. K. Dhavalikar and Z. D. Ansari of the Deccan College Post-graduate and Research Institute, Pune, assisted by P. K. Thomas, S. R. Walimbe, M. D. Kajale-Subha Khandekar, Vasant Shinde, Y. S. Rasar, Vishwarao and V. K. Nagpure resumed excavation with a view to uncovering the late Jorwe settlement on the eastern fringe of the site (INM I). The entire project is funded by the University Grants Commission.

The earlier excavation at this site revealed a number of round huts of Period III (Late Jorwe) of *circa* 700 BC. But this season's work shows that even during this period people lived in large rectangular houses, some of which were multi-roomed. Of the houses exposed this year, one (no. 105), measuring 5.80 x 4.25 m, was completely burnt leading to the death of a three-year old child. Belonging to the earlier levels of Period III, it contained a number of storage jars in which charred grains were found in good quantity. Among the grains, barley, lentil, peas, hyacinth beans etc., have been identified. This house had three more rooms and in the room on the south was found an extended burial (pl. XXVI A) containing the skeleton of a male below that of a female, with heads to the north. Inside the burial pit, there were twelve pottery vessels. To the west of the above-mentioned house-complex there were two small oval huts (nos. 113-114), one of which had a series of post-holes around. Both the huts have sunken floors (20 cm deep) and seem to have belonged to the house-complex no. 105.

Yet another oval hut (pl. XXVI B), with sunken floor (17 cm deep) and having a low mud wall (15 cm height), was noticed to the west of the above house. Though its floor was not well-made its noteworthy feature was the occurrence of a semicircular verandah to its south. A high flat-topped stone was rammed into the well-made floor of the verandah, and this stone appears to be an anvil for manufacturing microlithic blades and other tools, for inside the verandah and even outside were found hundreds of waste flakes and finished tools. Perhaps this hut, also forming a part of the house-complex no. 105, was the place for the manufacturing stone tools.

To the south of house no. 109 was noticed a large rectangular (pl. XXVII A) house (no. 110) measuring 6.35 x 4.15 m, the walls of which survived to a height of 30 cm. Inside the house, having a well-made floor, there were four flat stones, meant for supporting storage jars. In the central part was the fire-pit and in the eastern half another pit (84 x 40 x 35 cm), oriented north-south, which might have been a burial pit wherein the ceremonious burial, for some reason or the other, could not take place. Besides the above houses, there was a small quadrangular hut (house no. 103), measuring 3 x 2.20 m, with a central post-hole. It belonged to the middle phase of Period III; from upper levels no house-plans could be recovered.

A number of adult and child burials (pl. XXVII B) were encountered: adults buried in extended position while children were interred in two or sometimes even three grey ware urns placed mouth to mouth in a pit horizontally.

Besides the Late Jorwe, painted pottery finds include: a barbed copper arrowhead comparable to the Harappan types; an ivory disc marked with double circle; terracotta wheel on which spokes are shown by incised lines; beads of semiprecious stones; and blade-tools of chalcedony.

70. EXCAVATION IN LATE PLEISTOCENE DEPOSITS INAMGAON, DISTRICT PUNE.—G. L. Badami of the Deccan College Post-graduate and Research Institute, Pune, in collaboration with Christopher Burrow of the University of Cornell, Ithaca, USA, carried out the excavation in the late Pleistocene alluvial deposits exposed on the left bank of the river Ghod, just across the chalcolithic mound of Inamgaon.

It revealed two lithological units underlain by a black clay river deposit and overlain by a 91.5 cm thick black cotton soil. The two lithological horizons are sandy pebbly gravel and the yellow sandy silt. The lower one, sandy pebbly gravel, has yielded a large number of Middle Palaeolithic tools consisting of scrapers, flakes and cores, and several vertebrate fossils including a carapace fragment of a chelonia. The yellow sandy horizon has yielded Upper Palaeolithic blades but in the lower units some Middle Palaeolithic tools have also been found. The upper part of the horizon has yielded interesting evidence of microlithic tools which arc probably washed down from the upper reaches.

Important faunae recovered from the excavation are the bovid, equid and cervid (teeth and postcranials) and the evidence of reptiles, which are mostly concentrated on the lower unit of the yellow sandy horizon. Preliminary interpretation of the faunal elements suggests that the valley flats were covered by thick grasses and that probably a Savannah-type of environment existed during the late Pleistocene.

It may be recalled that a few years back the alluvial deposits of the Ghod yielded the first evidence of fossile hippo, dated about 20,000 BP. This find has a profound bearing on the palaeo-ecology of the valley, for it extends the geographical range of hippo to the south of Godavari before it became extinct.

71. EXPLORATION IN DISTRICT RATNAGIRI.—In order to understand the nature of eustatic changes during the Quaternary period S. N. Rajaguru and A. R. Marathe of the Deccan College, Pune, carried out geomorphological studies around Ratnagiri town. A bore-hole section (lat. 16°54' 10" and long. 73°4' 10") at an elevation of about 60 m above MSL revealed the following succession of strata (from top to bottom).

depth below surface (m)	*description of deposit*
0 — 7'70	massive vermiculite type of laterite (L^1)
7-70 — 14-10	lithomargic clay (?)
14˙10 — 14.25	hard ironstone band
14˙25 — 25.85	organic-rich plastic clay with plant fossils, pyrites and amber
25.85 — 4875	massive laterite with lithomarge at the base (L^2)
48.75 — and below	Deccan Trap to a depth of 25 m

More or less similar sequence was observed in a well situated in Shivaji Nagar area of Ratnagiri. A cobble gravel rich in laterite pebbles and cobbles was also noted at an elevation of about 25 m above MSL was found to rest on and againstt he laterite described above. The cobble gravel dips towards sea and passes below the present level. The presence of this cobble gravel is revealed in a foundation pit of the bridge on a creek at Sakhartar, near Ratnagiri. The section in the pit is as follows.—

depth below surface (m)	*description of deposit*
0 — 2.10	massive vermiculite type laterite
210 — 5-30	lithomargic clay (?)
5-30 — 10-80	cobbles, fossil wood at a depth of 6.9 m

A Carbon 14 date of the wood sample collected from the deposit mentioned above is 45,000 years BP.

On the basis of the above data it can be suggested that: (i) laterites around Ratnagiri are of primary origin; (ii) laterite (L^1) developed on old estuarine deposits are younger than those developed at higher elevations (200 m and above); (iii) cobble gravel is younger than L^1 and seems to have formed when the sea level was considerably lower than the present one; (iv) presence of gravel bed about 10 m below the present sea level indicates lowering of sea-level at least 10 m below the present level some time during the late Pleistocene (~ 100,000—~ 65,000 years BP) ; and (v) the occurrence of carbonaceous clay bed of estuarine origin suggests, on the other hand, that the sea-level was higher (about 45 m) than the present one.

Geomorphological features described above clearly indicate changes in sea-level during the Quaternary. These changes seem to occur in response to tectonic and glacio-eustatic factors.

72. EXCAVATION AT RAYGAD, DISTRICT RAYGAD.—The South-western Circle of the Survey under the direction of R. G. Pandeya assisted by R. C. Agarwal, T. N. Keshva, D. M. Kulkarni and G. L. Gaikwad conducted excavations in the Coronation Hall with a view to finding out any possible remains of superstructure which once adorned over the throne-platform of Shivaji at the Raygad fort.

The excavation revealed that the lower platform was built on a raised hollow enclosure filled in with big stones, brick-bats and mud. Within the filling the stone pillar-bases were placed in an alignment for erecting wooden pillars for supporting the wooden superstructure. Similar method was followed in constructing the upper platform (throne platform). Rectangular stone slabs were placed in alignment possibly to support the superstructure. Stray finds of tiles may indicate the use of tiles on the superstructure.

Antiquities included a lead ball, iron nail and a copper coin of *Chhatrapati* Shivaji bearing a legend in *Devanagari* script.

73. EXPLORATION IN DISTRICT THANA.—S. N. Rajaguru, M. D. Kajale and S. N. Ghate carried out geo-archaeological studies of the early and late historical port-sites around Sopara (19°24' N; 72°48' E), Agashi (19°26' N; 72°48' E) Gas (19°23' N; 72°46' E), Bhuigara (19°23' N; 72°45' E) and Nirmal (19°23' N; 72°46' E). All these sites are situated on an alluvial flat developed in the doab of the Ulhas and the Vaitarna rivers and are about 0-5 to 2 km inland from the present coast. Examinations of data from silted-up creeks, well-sections, road-cuttings and bore hole at Kasheli creek (19° 14' N; 72°58' E), 32 km upstream of the Ulhas (altitude 2.36 m) brought out the following important facts about changing sea-level during the late Quaternary.—

(i) The occurrence of clacareous reddish brown clayey loam at a depth of 8 to 10 m below the modern sea-level at Kasheli indicates the development of an alluvial flat during low sea-level phase of the Pleistocene; (ii) that the sea-level was gradually rising with minor regressive phases during the terminal Pleistocene to the early Holocene is suggested by the occurrence of beach-rock and tidal clay 3 to 4 m below the present level; (iii) the occurrence of beach-rock below the alluvial clay rich in early historical pottery in road-cutting sections at Bhuigaon and in well-sections at Gas suggests that the sea was at least 2 km inland and was more or less at the present level some time during the mid-Holocene; and that (iv) the alluvial flat, a few meters above the present sea-level, contains redeposited pottery of early to medieval periods. This evidence suggests that the silting has taken place in the recent past and that the majority of the sites are disturbed due to recent flooding in the area.

The survey shows that the sea-level has been low by a few meters during the early Holocene and it reached its present level just prior to the early historical settlements in the

area. In the absence of detailed archaeological excavations and geochronological data it is not yet possible to pinpoint the palaeo-geographical changes in the area during the late Quaternary.

MANIPUR

74. EXPLORATION IN DISTRICT WEST MANIPUR.—O. Kumar Singh and Th. Angou Singh of the State Archaeology, Government of Manipur, assisted by two Research Assistants explored Tharon with a view to determining the archaeological potentiality of the area. The exploration brought to light a cave-site to the north of the Tharon village at a distance of about 3 km. A stream Kalemikmagu is flowing near the site and exploration along this stream yielded patinated edge-ground pebble tools, scraper, scraper on flake, proto-handaxes (?) and an elliptical pebble with grinding faces. The tools, showing patina, are made of fine sandstone. Exploration along the stream Fiyanggu, about 1.5 km south-west of the above site, brought to light carved animal and anthropomorphic figures on the stream-bed at four places. These engravings have similarities with the folk art of the Kabui Nagas.

NAGALAND

75. EXPLORATION IN DISTRICT TUENSANG.—In course of exploration the Department of Art and Culture, Government of Nagaland, collected a few Neolithic stone celts and terracotta objects at Chungliyimiti and Changsang.

ORISSA

76. EXPLORATION IN DISTRICT CUTTACK.—In course of exploration Subhra Bose and A. K. Bandyopadhyay of the Eastern Circle of the Survey noticed a small *triratha* stone temple on the left bank of the river Bilukhali, about 40 km from Cuttack. Being known as Bhubaneswar Mahadev temple its exterior is embellished with beautiful figures of Vinadhara Siva, Parvati, Ganga and Yamuna, Kartikeya, Ganesa etc., besides Siva in various forms.

77. EXPLORATION IN THE CHITROTPALA VALLEY IN DISTRICT CUTTACK.—The State Department of Archaeology, Government of Orissa explored Kendrapara and Salipur P. S. in the Chitrotpala valley and noticed ancient remains ranging from *circa* eighth to thirteenth century AD. Among these a dilapidated Siva temple of *triratha* plan at Lendura Bhagabanapuri worth mention as its sculptures belong to the Buddhist pantheon. Trial diggings at Branhabana near Salipur revealed the existence of a Buddhist establishment datable to *circa* tenth-eleventh century AD, along with inscribed images of Avalokitesvara, Tara, Manjusri, etc. On the back of the images are inscribed Buddhist *Dharani.*

In the Paradeep region L. M. Wahal of the Eastern Circle of the Survey noticed a temple, dedicated to Devi, on the left bank of the river Chitrotpala. The site yielded images of Kartikeya, Ganesa, Parvati, Bhairava, Vishnu, Tara etc.

78. EXPLORATION IN PRACHI VALLEY IN DISTRICT CUTTACK AND PURI.—L. M. Wahal and A. K. Bandyopadhyay of the Eastern Circle of the Survey explored the Prachi valley and found a large number of medieval temples and sculptural remains at Phulnakhara (16 km from Cuttack), Sundargaon (25 km from Bhubaneswar), Bagalpur (near Sundergram), Kantapara (30 km from Bhubaneswar), Koanera (32 km from Bhubaneswar), Adaspur (37 km from Bhubaneswar), Kenduli (under Balianta P. S. of Puri District), Prataprudrapur (near Kenduli), Gobindrampatana (5 km from Adaspur), Manikpur (7 km from Adaspur), Jamu Goradi (under Govindpur P.S. of Cuttack District), Bhapur (in Balianta P.S. of Puri District), Niali (50 km

from Bhubaneswar), Madhera (5 km from Niali), Pitapara (61 km from Bhubaneswar), Krishna Prasadgarh (60 km from Bhubaneswar), Motia (65 km from Bhubaneswar), Tola and Naupatna (54 km from Bhubaneswar), Amareswar (60 km from Bhubaneswar), Bandeswar (under Nimapara P.S. of Puri District), Kakatpur (56 km from Bhubaneswar), Panichatra (60 km from Bhubaneswar), Somesavra (58 km from Bhubaneswar), Mudgal Madhava (64 km from Bhubaneswar), Nilakanthapur (62 km from Bhubaneswar) Kuhudi (near Kakatpur), Astrang (60 km from Bhubaneswar), Ramchandi (70 km from Bhubaneswar), Turintara (15 km from Bhubaneswar) and Kurum (10 km from Konarak). The temples located in the above sites are built mostly in *pida* order and the images found therein belong largely to the Brahmanical pantheons though the number of Buddhist and Jaina images are not insignificant.

79. EXCAVATION AT BANKADAGARH, DISTRICT PURI.—The Department of Archaeology, Government of Orissa, while conducting a trial excavations at this site brought to light remains of a Siva temple datable to the post-Gupta period. Most of the sculptural representations are noticed over the *pabhaga* ('basement mouldings') of the extant temple. Among these, two-handed figure of Kartikeya, Bhairava and panels of animal figurines are noteworthy. Besides, eight ins cribed slabs assignable to the Sailodbhava dynasty (sixth-seventh century AD) were found.

80. EXPLORATION IN DAYA VALLEY, DISTRICT PURI.—In course of exploration in the Daya valley between Bhubaneswar and Delanga P.S. the Department of Archaeology, Government of Orissa, noticed: Somnatha temple (datable to *circa* eighth century AD) and Bani-Vakresvara temple at Ghordadiha, Siva temple at Delanga; and a group of monuments at Kaplibeswara in Tangi P.S. A systematic survey of this valley has revealed that both Saivism and Sakti cult were prevalent at the same time and these were followed by the cult of Ganapati.

PUNJAB

81. EXPLORATION IN DISTRICTS BHATINDA, HOSHIARPUR AND RUPNAGAR.—K. K. Rishi of the Department of Cultural Affairs, Archaeology and Museum, Punjab carried out an explora tion and located the following sites of archaeological interest.

District	*Site*	*Cultural assemblage*
Bhatinda	Chhoti Mansa	mature Harappan and late Harappan
-do-	Hirke	pre-Harappan, mature Harappan and late Harappan
-do-	Laluana	pre-Harappan, mature Harappan and late Harappan
Hoshiarpur	Garhi	pebble choppers, scrapers, cores and flakes
-do-	Harziana	pebble choppers, scrapers and flakes
.do-	Khanni	chopper-chopping tools, cores, flakes and cleavers
-do-	Kot & its western slopes	pebble choppers, scrapers and flakes
-do-	Lalwan	choppers, scrapers, cores, flakes and cleavers
-do-	Mansaul	unifacial and bifacial choppers and flakes
Rupnagar	Jatwarh	pebble chopper-chopping tools, cores and flakes
-do-	Jhangrian	choppers, scrapers, cores, flakes and cleavers

District	*Site*	*Cultural assemblage*
-do- (lakes and	Kangra	chopper-chopping tools, cores, cleavers
-do- flakes and	Kanpur Khui	chopper-chopping tools, cores, cleavers
-do- flakes,	Kukowal	chopper-chopping tools, cores, cleavers and handaxes

82. EXCAVATION AT SANGHOL, DISTRICT LUDHIANA.—In continuation of earlier work of the Department of Cultural Affairs, Archaeology and Museums, Government of Punjab, resumed excavation with a view to (i) expose more house-plans of the Bara levels including their relationship with the Painted Grey Ware and (ii) to bring to light further evidence of the monastery and stupa-complex towards the northern area of the site.

Period I A represented by only pottery consisting of dish-on-stand and storage jars. Except a few post-holes and pits, no structural activity was noticed. A painted sherd depicting a tigress with cubs clinging to its belly was a noteworthy find.

Period I B witnesses six structural phases of the Bara level. Phase I yielded evidences of mud-structures and the remains of furnaces and corn-bins. Phase II was distinguished by the occurrence of mud-brick structures like living rooms, storage rooms and industrial complexes and oval-shaped furnaces, corn-bins, saddle querns etc. Subsequent Phases III, IV, V and VI are represented by houses made of packed earth. Cultural equipments remained the same.

Simultaneously monastic cells and portions of the stupa-complex towards the north-east were exposed. A *surkhi*-paved pathway was traced along with a votive stupa. Among the important antiquities mention may be made of a copper chisel, a terracotta bull, ninety-two tiny barrel-shaped gold beads and about a dozen eye-shaped beads.

83. EXPLORATION IN DISTRICT LUDHIANA.—J. M. Thapar of the North-western Circle of the Survey in course of his Village-to-Village exploration along the old bed of the Sutlej noticed the following sites of archaeological interest.

Taluk	*Village/site*	*Extent of mound*	*Cultural assemblage*
Ludhiana	Alamgir (30°45' N; 75°50' E)		grey ware, Kushana and medieval
-do-	Gurudwara Minji		late medieval
-do-	Burkhara (30°35'; 75°55')	200 x 200 m; deposit 2 m	late Harappan, Kushana, Rangmahal, medieval and terracotta objects
-do-	Basami (30°55'; 75°43')	200 X 200	Harappan, late Harappan, Kushana and medieval
Ludhiana	Birmi (30°55'; 75°45')	100 X 1000 m; deposit 4 m	late Harappan and medieval

Taluk	*Village/site*	*Extent of mound*	*Cultural assemblage*
-do-	Chhapar (30°40'; 75°45')	150 X 150m; deposit 4 m	Kushana, medieval and terracotta objects
-do-	Dhandari Khurd (30°52'; 75°55')	badly disturbed	Kushana, Rangmahal, early medieval
-do-	Gadowal (30°55'; 76°1')	—	Kushana and medieval
-do-	Gaunspur (30°57'; 75°42')	400 X 300; deposit 3 m	late Harappan, Kushana, Rangmahal, medieval terracotta objects and medieval coins of circa 13th century AD
-do-	Dargah of Baba Daryai Badashah		
-do-	Mazar known as Ahmed Shah De Rozyu		medieval
	old mosque being used as Gurudwara		medieval
Ludhiana	Hissowal (30°48'; 75°40')	150 X 150 m; deposit 2 m	medieval
-do-	Jangpur	200 X 100 m; deposit 1 1/2 m	Kushana, Rangmahal and medieval
-do-	Kanganwal (30°51'; 75°56')	5000 sq.m; deposit 11/2 m	late Harappan, Kushana, Rang- Kushana, Rangmahal, medieval, terracotta object
-do-	Khasi Kalan (30°56'; 75°57')	(a) 200 X 400 m; deposit 3 m	medieval
		(b) mosque	about 100 years old
-do-	Khera (30°38'; 75°57')		two late medieval temples dedicated to Siva and Krishna, Siva temple having crude paintings of Brahmanical divinities
-do-	Kum Kalan (30°55'; 76°5')	(a) two sites one measuring 200 x 150 m and other 250 X 250; deposit 31/2 m each	late Harappan, Kushana, Rangmahal and medieval
		(b) a mosque built of *lakhauri* bricks	about 100 years old
Ludhiana	Latala (30°4O'; 75°45')		double-storyed building housing images of Gaja-Lakshmi and Ganesa about 150 years old; Siva temple with crude paintings, about 100 years old
-do-	Mahlon	250 X 150 m; deposit 3 m	Kushana, Ranghmahal and medieval
-do-	Maluadh (30°37'; 75°55')		Siva temple about 100 years old

Taluk	*Villagej/sile*	*Extent of mound*	*Cultural assemblage*
-do-	Mangli Nichi (30°52'; 75°57')	200 X 2000 m; deposit 3 m	Bara ware, Kushana, Rangmahal, medieval and terracotta objects
-do-	Phagla (30°56'; 75°57')	two mounds 100 X 100 m with deposit of 3 m each	late Harappan, Kushana and medieval
Ludhiana	Sarabah (30°45'; 75°42')	300 X 200 m; deposit 2 m	Kushana and medieval
-do-	Tajpur (30°40'; 75°38')	20000 sq. m	medieval
-do-	Takki	(a) 300 X 100 m, deposit 3 m	medieval
		(b) old Mazar of Roshan Shah Ka Touzab	late Medieval
-do-	Then Lahara (30°35'; 75°20')	300 x 200 m; deposit 3 m	late Harappan and Kushana
Jagraon	Abupura (30°56'; 75°27')	150 x 50 m; deposit 1 m	medieval
-do-	Aliwal (30°57'; 75°32')		inscribed *burj* of British period, AD 1846
-do-	Bahini Raiyan (30°56'; 75°32')	50 X 100 m; deposit 2 m	Bara ware, Kushana, medieval and terracotta objects
-do-	Bhamal (30°56'; 75°31')	350 X 200 m; deposit 3 m	late Harappan, Rangmahal medieval and teracotta objects
Jagraon	Bhatta Dhua (30°57'; 75°39')	200 X 300 m; deposit 6 m	NBP (?) Kushana, Rangmahal and medieval
-do-	Bhundri (30°57'; 75°35')	400 X 200 m; deposit 4 m	early medieval
-do-	Bodalwala (30°50'; 75°29')	—	early medieval
-do-	Fidqui Chak		graveyard of some *pir* with his family members, medieval
-do-	Ghalib Khurd (30°52'; 75°25')	—	Bara ware
-do-	Gidar Windi (30°56'; 75°25')	200 x 200 m; deposit 3 m	late Harappan and medieval
-do-	Gorahar (30°56'; 75°35')	150 x 100 m, deposit 3 m	early medieval
-do-	Gorsian Qadir (30°57'; 75°33')	300 X 150 m deposit 1 1/2 m	late Harappan, Kushana and early medieval
Jagraon	Gurah (30°50'; 75°34')	60,000 sq m; deposit 3 m	Bara ware, Rangmahal, medieval and terra-cotta objects
-do-	Hambran (30°56'; 75°41')	250 X 250 m; deposit 3 m	Kushana and early medieval

Taluk	*Village/site*	*Extent of mound*	*Cultural assemblage*
Jagraon	Kular (30°48'; 75°35')	deposit 3 m	Kushana, Rangmahal, medieval and terracotta objects
-do-	Kiri (30°'56';75°31')	—	late Harappan
-do-	Kotla (30°56'; 75°38')	—	early medieval
-do-	Kota Mana (30°56'; 75°34')	—	graveyard
-do-	Mand Tihara (30°58'; 75°23')	—	Dargha of Hazrat Diwan
-do-	Mor Karima (30°50'; 75°37')	250 X 200 m; deposit 2 m	Harappan (?), Kushana, medieval and terracotta object
-do-	Parait		late Harappan
-do-	Ranke (30°57'; 75°37')		late Harappan
-do-	Raowal (30°54'; 75°32')		late Harappan
-do-	Raqba (30°49'; 75°39')	200 X 200 m, deposit 3 m	Kushana and medieval
-do-	Salempur (30°56'; 75°39')		Kushana
-do-	Sangatpura (30°53'; 75°33')		medieval
-do-	Sidhwan Khurd (30°50'; 75°33')		Kushana
-do-	Sidhwan Bet (30°50';75°33')		fortress
-do-	Talwara (30°57'; 75°32)		Kushana and Rangmahal

It is significant to note that the Buddha Nala of the Sutlej has produced a good number of protohistoric sites of copper-bronze age but none so far of the Painted Grey Ware.

84 EXCAVATION AT SINGH BHAGWANPUR, DISTRICT RUPNAGAR.—The Department of Ancient Indian History, Culture and Archaeology, Punjab University, Chandigarh, under the supervision of Y. D. Sharma assisted by R. P. Bhardwaj carried out excavation with a view to obtaining a complete sequence of the site.

Period I (*c.* 700 to 400 BC) is characterized by the occurrence of the Painted Grey Ware. Its occurrence is limited and it becomes rare in the upper layers. Associated with it are plain grey, black-slipped and dull red ware. The plain grey ware bears brownish grey sip, silver grey slip being confined to the Painted Grey Ware. A sherd of the Painted Grey Ware class was found to have been burnt to red colour; it bears creamish red slip and orange red painting. The shapes in the Painted Grey and plain grey wares are largely vertical-sided dishes with sagger base The bowls have similar features, but have a disc base (fig. 8, 12-22) when their size is small.

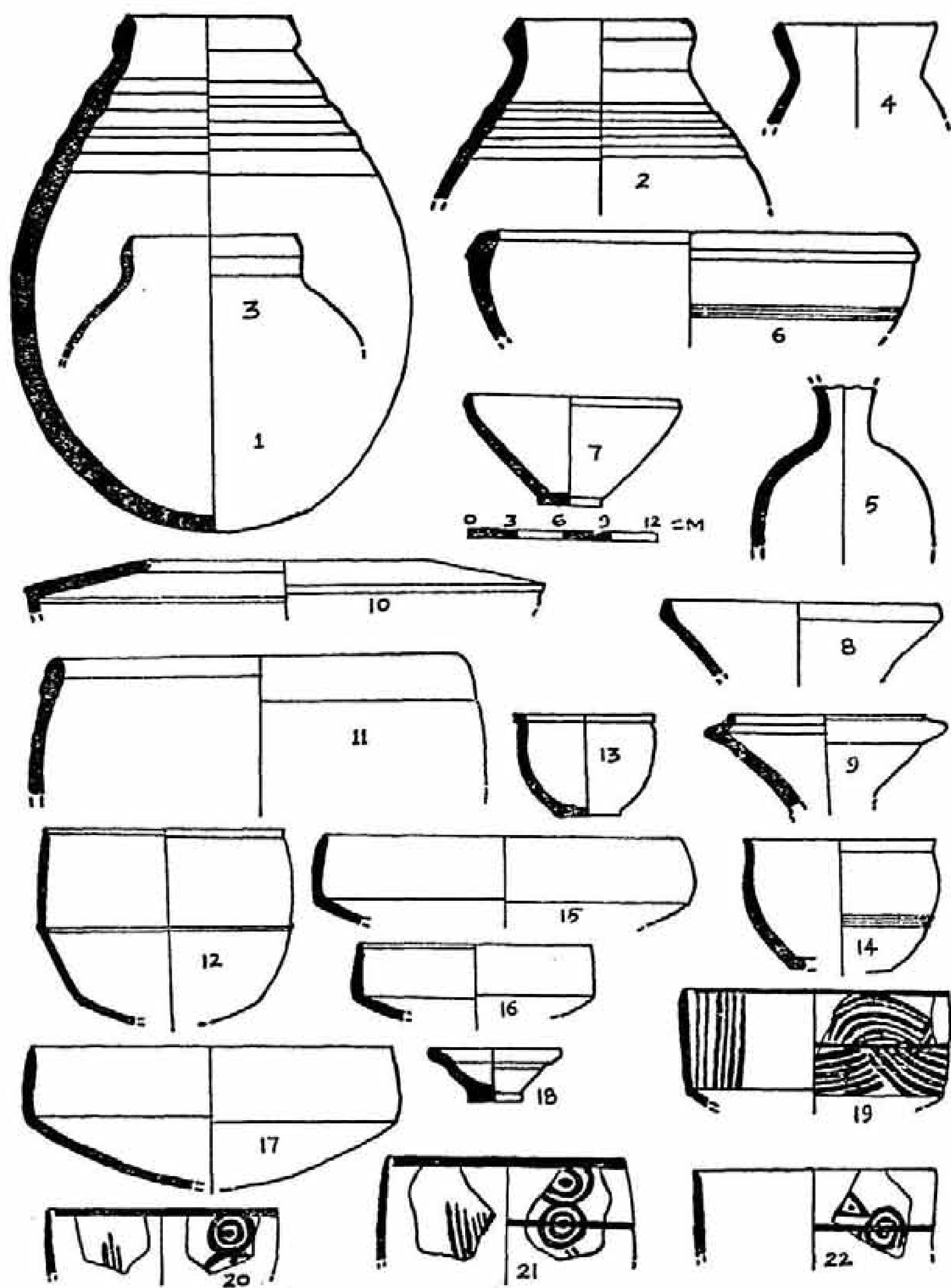


FIG. 8. *Singh Bhagwanpur : pottery types*

Black-slipped ware was available in tiny pieces. Among the red wares both red and ochrous slip and wash have been noticed. Types are represented by thick-sectioned large jar, vase with double-grooved rim, jar-stand with concave sides, vase with diagonally-placed rim, vase with narrow vertical neck, basin with collared rim and deep bowl with wide mouth are some of the red ware types. Pear-shaped vase with corrugated upper profile (fig. 8, 4-6, 11), small bowl with mildly incurring rim, bowl-cum-lid with folded rim and carinated *handi* with featureless rim (fig. 8, 1-3, 7-10) are the types in red ware which are popular in the Gangetic sites like Ahichchhatra and Hastinapur and on the Sutlej at Ropar. In the Ganga valley they occur normally with the Northern Black Polished Ware.

Lumps of iron slags and fragmentary iron objects like a flat clamp bent at both ends, pieces of a spearhead, a short tabular object and thick rods of nails are present. Bone objects include stylii, awls, knitting needles, kohl-sticks and points of uncertain use. A beautifully-ground and polished stylus point has a socket for holder. Glass was used for bangles and beads. A faience bangle piece has obviously found its way from the Bara culture site. A fragmentary bangle shell was also found. Terracotta objects include dabber, skin rubber, gamesmen and bull (pl. XXVIII A).

Evidence of housing was limited to some post-holes and lumps of burnt clay bearing reed impressions.

Period II *(c.* 200-300 AD) is attested largely by pottery, a red ware bearing a dull ochrous wash. Vase with long vertical neck, vase with beaked rim, large jar, basin with grooved collar, cooking pan with rim-handle or holder, large or small bowl with sharpened rim and internally-corrugated body and a bowl-cum-lid with out-turned rim and carrinated body are some of the shapes of the period (fig. 9, 1-15). But vases with shoulders stamped with characteristic motifs are the hallmark of this period (fig. 9, 16-22). Important antiquities include: two Indo-Greek and one Kushana coins, bone stylii, triangular pendant with a groove for securing it with thread, terracotta beads, a pendant, skin-rubber, a mould for turning out fluted beads; a small perforated bronze bell; two pieces of so-called pottery stamps (pl. XXVIII D); and fragmentary iron objects.

No structural activity was noticed save 1.80-m high of baked bricks wall during the period.

Period III *(c.* 900-1500 AD) represented by 2.30-m thick deposit yielding both grey and red wares, the former bearing a smooth dark grey slip, being used on a restricted scale, mainly for *chilam* (bowl) and water container of the *hookah* (fig. 11, 13-14). Important shapes in red ware are cooking *handi,* some of which have a rusticated base in wet-ware technique, flat-based vase with cordoned neck and splayed-out rim (fig. 10, 11-12), large inkpot with a flanged waist, spouted vase etc (fig. 10, 14-16). Bright red slip and painting in black is not uncommon. There is a large variety in bowls and basins (fig. 11, 1-7, 10-11). Variety is also noticed in incense-burners, one of them decorated with lamp-design on the rim (fig. 11, 8, 9, 15). Pieces of glazed ware with green, blue and white enamel have been recorded.

Interesting antiquities include: bronze hook and collyrium applying-pencils; heavy iron slags; stone querns and pestles; and bangles of glass, shell, terracotta, lapis lazuli, carnelian and agate. Terracotta beads are generally spherical or shaped like arcanut. A tortoise, made from milky white quartz, perhaps served as pendant (pl. XXVIII C). Besides, a large number of terracotta objects like dabber, skin-rubber, animal figurines, human head, gamesmen are other finds from the period. The figure of a large hollow horse brings to light a new tradition in folk art (pl. XXVIII B).

RAJASTHAN

85. EXPLORATION IN DISTRICT ALWAR.—C. Margabandhu and R. P. Sharma, assisted by Budhi Singh, Gurnam Dass and D. D. Dogra explored the banks of the river Sahibi from Kot

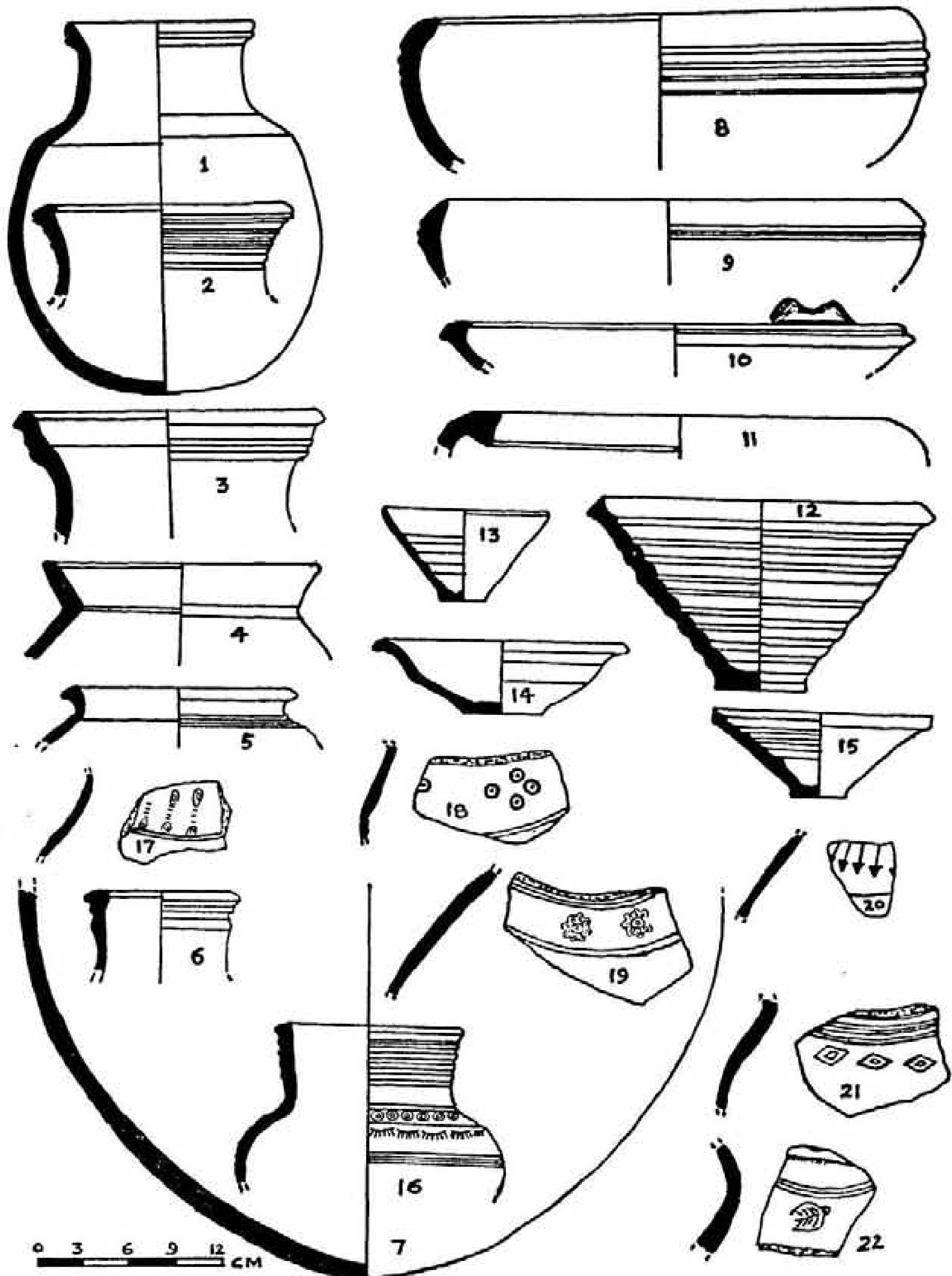


FIG. 9. *Singh Bhagwanpur : pottery types*

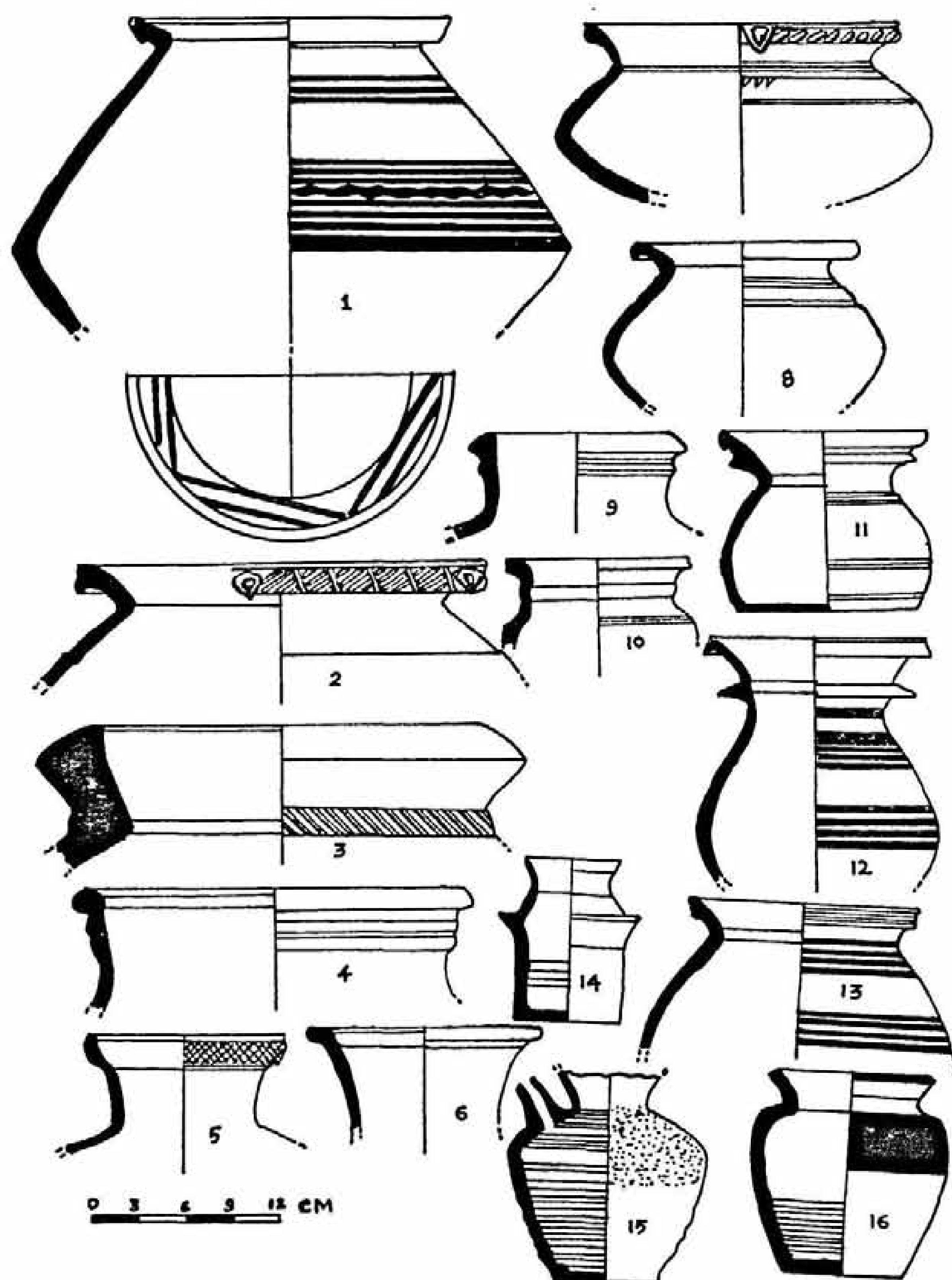


FIG. 10. *Singh Bhagwanpur : pottery types*

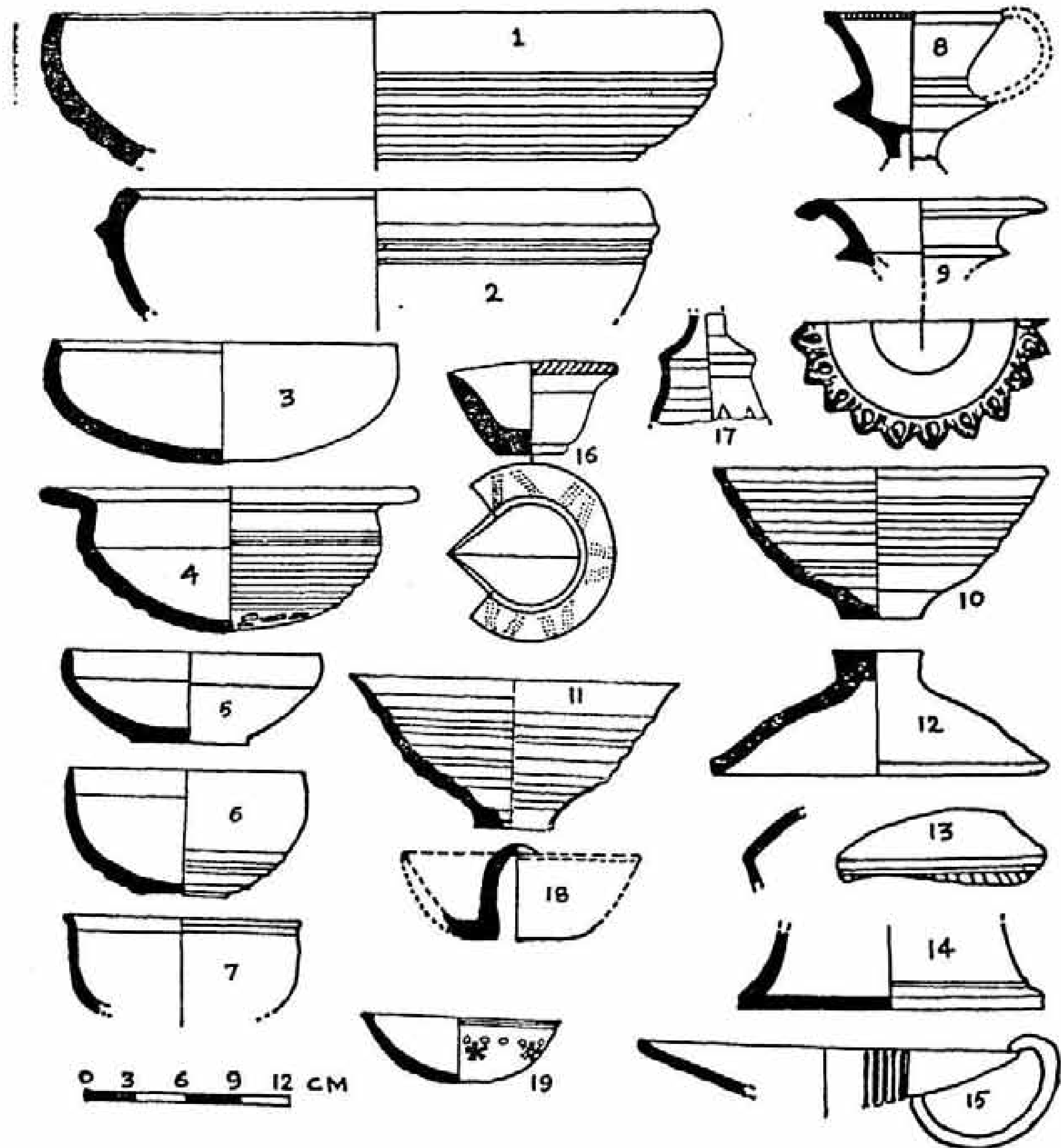


FIG. 11. *Singh Bhagwanpur : pottery types*

Qasim in the north to Ramganar in the south with a view to ascertaining the migrational pattern of the protohistoric people and tracing the calender of archaeological cultures of the area.

The exploration revealed thirty sites containing antiquities from protohistoric times down to the medieval period. Protohistoric remains, mainly comprising ceramics, were noticed at Qadain, Karnikot and Ramnagar on the eastern bank, and Palawa and Helmana Khurd on the western bank. The protohistoric red ware, the available types being dishes and vase, bears resemblances to the Ochre-coloured pottery of the Ganga valley. On certain sherds dark brown polish was also noticed. It appears that the protohistoric migrations had taken place along the eastern bank of Sahibi.

The early historical pottery comprising the Kushana and Rangmahal red ware types and coarse grey ware came from Bcdawas, Sehali Kalan, Tigaon, Gangapur, Bagheri, Sailkhara, Ajarka, Tejpura, Babiriya, Ramnagar, Bijwara, Jalabas, Sanauli and Khori.

Medieval forts were located at Karnikot, Sarai Kalan, and Bijwara. Bronze images of the Jaina pantheon were noticed in a temple at Sanauli.

86. EXPLORATION IN DISTRICT BHARATPUR.—In continuation of the previous year's *(1979-80,* p. 62) work, B. S. Negi of the Delhi Circle of the Survey under the Village-to-Village exploration noticed Painted Grey Ware sites at Bahaj, Umra Au, Songaon, Jatoli-thun, Januther, Gulena, Gahanawali, Kama, Agama and Vajhara while mounds of historical period were located at Ghata, Nigaon, Tankoli, Barali, Khera, Gujar Girsa, Sisara, Matoli, Jhoolka, Sinsaini, Akata and Chhichhuari. He also located temples-sites at Vajhera and Shahpur.

87. EXPLORATION IN DISTRICT BHILWARA.—B. L. Nagarch and R. D. Singh assisted by S. C. Saran, P. K. Trivedi, R. Pathak, V. H. Parmar and A. R. Shah of the Western Circle of the Survey, explored the mound at Aguncha on the bank of the river Mansi. Exploration yielded ring-wells and brick-walls (brick sizes: 57 x 27 x 9, 54 x 27 x 8, and 45 x 28 x 9 cm), besides pottery in red ware, black-burnished and black-slipped ware, the types being bowl, dish, vase, jar and carinated *handi.* Other finds include: terracotta mother goddess, figurines of dog and bull; beads and sling balls; shell and ivory bangles; fifty-five copper punch-marked and cast coins: images of Vayu, Ekamukha Siva-linga, Mahisamardini, four-armed Vishnu, *yonipatta* with three *Kichakas,* Kartikeya, female standing figures; feet of a standing Tirthankara figure on a lion throne; and a lintel of the sanctum-doorway of a Vishnu temple.

In the course of further exploration, an exposed section on the road between Aguncha and Bhilwara was examined. It revealed at the earliest level evidences of plain red ware, black-on-red ware, black-slipped ware, Painted Grey Ware and the Northern Black Polished Ware. This may be called Period I (pre-Maurya and Maurya). Small finds include iron slags, terracotta weight, disc, bead, burnt bricks, punch-marked coins, terracotta mother goddess, besides human and animal figurines.

The next succeeding deposit (Period II : Sunga-Kushana) is characterized by a stone plaque of Vishnu, terracotta objects, including human and animal figurines.

Period III (Gupta) is characterized by the presence of double course of brick floor. Antiquities include terracotta head of a Saiva ascetic, besides beads.

88. EXCAVATION AT SUNARI, DISTRICT JHUNJHUNU.—R. C. Agrawal and Vijai Kumar of the Department of Archaeology and Museums, Government of Rajasthan, undertook excavation at Sunari (27°53' N; 75°56' E), about 150 km from Jaipur with a view to determining the stratigraphic position of the Painted Grey Ware and earlier pottery tradition, if any. The ancient mound of Sunari in Khetri Tehsil, is located on the right bank of river Kantli, a river which played a major role in the diffusion of ancient cultures. No less than fifty sites representing prehistoric to the early historical cultures have been discovered in the Kantli river basin, most

important amongst them being the Copper age site of Ganeshwar at the cource of the river. But this is the only site yielding the Painted Grey Ware. The excavation revealed the following three periods of culture.

Period I is characterized by the presence of Grey Ware, often painted in black pigment. Important types are straight-sided bowls and dishes with incurved sides. The black-and-red and black-slipped wares formed a significant percentage in the assemblage. The black-and-red ware, being unpainted and different from that of Ahar, is represented by dishes and bowls. The black-slipped ware is generally available in fine to medium fabric, the prominent shape being bowl. Important antiquities include various iron implements, copper objects, bone points, beads of terracotta and semiprecious stones. Discovery of two furnaces for smelting and forging iron objects in the early phase of the Painted Grey Ware is a noteworthy feature of this period.

Period II is represented by unslipped ware though black-and-red and black-slipped wares continued; true N.B.P. sherds were also found. Thus the period may be assigned to the period coeval with that of the Northern Black Polished Ware. Among the important antiquities, mention may be made of a stone plaque bearing auspicious Buddhist symbols, iron implements and copper objects.

Period III is represented by typical pottery of the Sunga-Kushana period and important finds include a seal with an inscription in the *Brahmi* characters, terracotta animal figurines, and copper cast coins.

89. EXPLORATION IN DISTRICT JHUNJHUNU.—The Department of Archaeology and Museums, Government of Rajasthan, in the course of exploration discovered the following sites in District Jhunjhunu.

Site	*Cultural assemblage*
Badalgarh	historical red ware, early
Buda	historical red ware, early
Chava Sri	Harappan pottery, red ware
Chinchroli	Ochre-Coloured Pottery (O.C.P.), copper slag
Galunda-i-dur	O.C.P., natural caves
Jodhpur	O.C.P., microliths
Khudana	red ware, historical
Kojar	O.C.P.
Kaluala	red ware, historical
Marot	red ware, historical
Naurangpur	red ware, historical
Padeva	red ware, historical
Serfraguvar	O.C.P.

90. EXPLORATION IN DISTRICT JHUNJHUNU AND SIKAR.—In continuation of the last year's (*1979-80,* pp. 62-65) work V. S. Srivastava of the Department of Archaeology and Museums, Government of Rajasthan, in the course of his exploration revealed a rich and interesting tradition of wall paintings in temples, forts, step-wells, cenotaphs, and private mansions depicting various religious and social themes. Exploration further revealed a number of important inscribed memorial pillars ranging in dates from the ninth to the twelfth century

AD in *Kutila* and *Devanagari* scripts at Phagalwa, Piprali, Dhaud, Bhuvala Tatnava, Katrathal, Paldi and other places.

91. EXPLORATION AND EXCAVATION IN DISTRICT NAGAUR.—In continuation of the last year's (*1979-80,* pp. 65-67) work V. N. Misra and S. N. Rajaguru assisted by D. R. Raju, P. R. Kulkarni, M. D. Kajalc and H. Raghavan of the Deccan College Post-graduate Research Institute, Punc, carried out explorations and excavations in and around Didwana with a view to collecting further stratigraphic and sedimentological evidence for the Quarternary palaeo-climate. This year's field-work was carried out mainly around Didwana and Tal Chhapar in the north (fig. 12) while excavation was carried out at two places: (i) on the western edge of Singi Talav quarry; and (ii) on the southern bank of the Bangur canal opposite the village of Indola-Ki-Dhani (fig. 13). The stratigraphy and cultural sequence at the two sites are as follows (fig. 14).

Singi Talav

Layer	*depth below surface (cm)*	*description of rock unit*
1	0 — 8	brown silty sand, sharp contact to
2	8 — 25	greyish clayey silt, sharp contact to
3	25 — 80	greyish green strongly *kankarized* clayey loam, grades to
4	80 — 90	*kankar* crust or oalcrete, grades to
5	90 — 125	greyish green moderately *kankarized* clayey loam; ferruginous pellets common.

Artefacts made on vein quartz and quartzite were found all through the deposit. On the basis of stratigraphy and typology two horizons can be recognized: one between surface and 15 cm and the other between 15 cm and 120 cm. The assemblage of Horizon 1 consists of small flakes and scrapers and can be assigned to the Middle Palaeolithic. In Horizon 2 an assemblage of handaxes, choppers, chopping tools and polyhedrons was found. On typological and technological grounds this assemblage represents an early Acheulian stage (pl. XXIX A-G). The artefacts are remarkably fresh suggesting that they were used and possibly made near the find-spot and got incorporated in the fine loamy sediment which was formed either in a lake or pool or in a very sluggishly flowing channel. The concentration of artefacts between 40 cm and 80 cm depth from the surface and the presence of a hard calcrete layer below 80 cm depth suggests occupation on a dry land surface alongside a water source.

Indo-ki-Dhani (fig. 14)

Layer	*depth below surface (cm)*	*description of rock unit*
1	0 — 60	reddish brown, non-calcareous moderately consolidated dune sand, sharp contact to
2	60 — 135	brown *weakly-kankarized* dune sand, sharp contact to
3	135 — 240	greyish green, strongly *kankarized* (concretionary) grades to
4	240 — 272	greyish green, strongly *kankarized* (less concretionary) loam, grades to
5	272 — 410	gravelly-sandy, greyish green moderately-*kankarized* and weakly laminated loam, grades to
6	410 — 515	gravelly-sandy, greyish green, moderately *kankarized* laminated loam with soft ferruginous pellets.

QUATERNARY GEOLOGICAL AND PALAEOLITHIC SITES IN THE THAR DESERT

FIG. 12

Layers 3 to 6 represent the same deposit (Amarpura Formation) as the one at Singi Talav. Presence of hard micro-crystalline *kankar* concretions between 135 and 240 m indicates periodic drying of the flood plain. As a whole, the nature of sediments shows that there was a gradual lowering of the water-table and consequent disorganization of the drainage system in the area. Stone artefacts were found in all the layers of the Amarpura Formations but a part of layers 4 and 5 (385-445 cm) was sterile. Three archaeological horizons can be recognized in this deposit from below upwards.

Horizon 3 (446-505 cm).—This yielded only 10 artefacts, mainly due to the restricted area (4 sq m) excavated. There is only 1 finished tool, a chopper; thus the assemblage cannot be culturally specified.

Horizon 2 (186-385).—This yielded a total 441 artefacts of which 30 are finished tools. These latter include 2 incomplete handaxes, 7 points, 7 scrapers, 6 choppers, 3 chopping tools, 3 polyhedrons and 2 knives. The high percentage of debitage (93-19%), specially flakes and chips, shows this horizon to be of the nature of a workshop. The higher proportion of flake-tools like scrapers and points and the smaller size of tools in comparison to the Acheulian industry of Singi Talav suggests this assemblage to be of late Acheulian character.

Horizon 1 (135-185 cm).—This yielded 266 artefacts, 17 of them finished tools. The latter include 7 discoids, 5 choppers, 2 denticulates and 1 specimen each of scraper and point. The absence of handaxes and polyhedrons and the generally smaller size of the tools in comparison to those of Horizon 2 suggests that this assemblage to be of the Middle Palaeolithic Age.

Rich Acheulian industries were also found in the Amarpura Formation in the Amarpura quarry in the excavated debris of the Bangur canal near Didwana and at Jankipura (pl. XXIX D) and Koliya, east of Didwana. Middle Palaeolithic assemblages were found at Mangalpura, Shyampura and Jenana in the uppermost part of the Amarpura Formation, north of Didwana (pl. XXIX B).

Another excavation was done along the eastern bank of the Bangur canal at 16 R point between Didwana and Marwar Balia village mainly to expose the stratigraphy of the dune. Digging was done to a depth of 10.2 m without reaching the base of the dune. The trench revealed three lithological units. The topmost unit (I), 5.30 m thick, is represented by dune sand. The upper 2.1 m of this deposit is brownish, non-calcareous, well-sorted coarse to medium sand and represents eluvial horizon of a soil developed in the dune sand. The illuvial horizon from 2.10 to 5.30 m is yellowish brown in colour and contains diffused powdery carbonate and small (0.5 to 2 cm) amorphous carbonate pellets. At the base of the dune sand there is a 10-cm colluvial gravel rich in sub-angular slate and schist fragments. This gravel represents hill-wash deposits derived from the nearby hills during stormy rains in the past. It rests disconformably on a calcreted surface which forms the top of the second lithological unit. The calcrete grades into yellowish brown, well-sorted fine to medium grade sand, rich in hard micro-crystalline carbonate nodules of 3 to 6 cm size, to a depth of 6.8 m and then into a sandy layer relatively poor in carbonate nodules and containing powdery carbonate diffused throughout the mass of the sand to a depth of 8.92 m. At its base this deposit contains a colluvial gravel 5-10 cm thick. This gravel rests disconformably on a calcreted layer developed on a reddish brown fine to medium sand exposed to a depth of 10.2 m (Unit III). The carbonate nodules are hard, crystalline and vary in size from 2 to 8 cm. They are found to be disseminated throughout the mass of the basalmost litho-unit.

Unit I is definitely of aeolian origin. Units II and III represent strongly pedogenized or calcified fine to medium sands without any trace of depositional structures. The presence of calcrete layers overlain by colluvial washes between Units II and III, and between Units I and II clearly suggests that these units have been separated by palaeosols suggestive of stabilization of landscape prior to the deposition of successive younger sediments. Exact origins of Units II and III could not be decided though they are likely to be of aeolian origin. All the

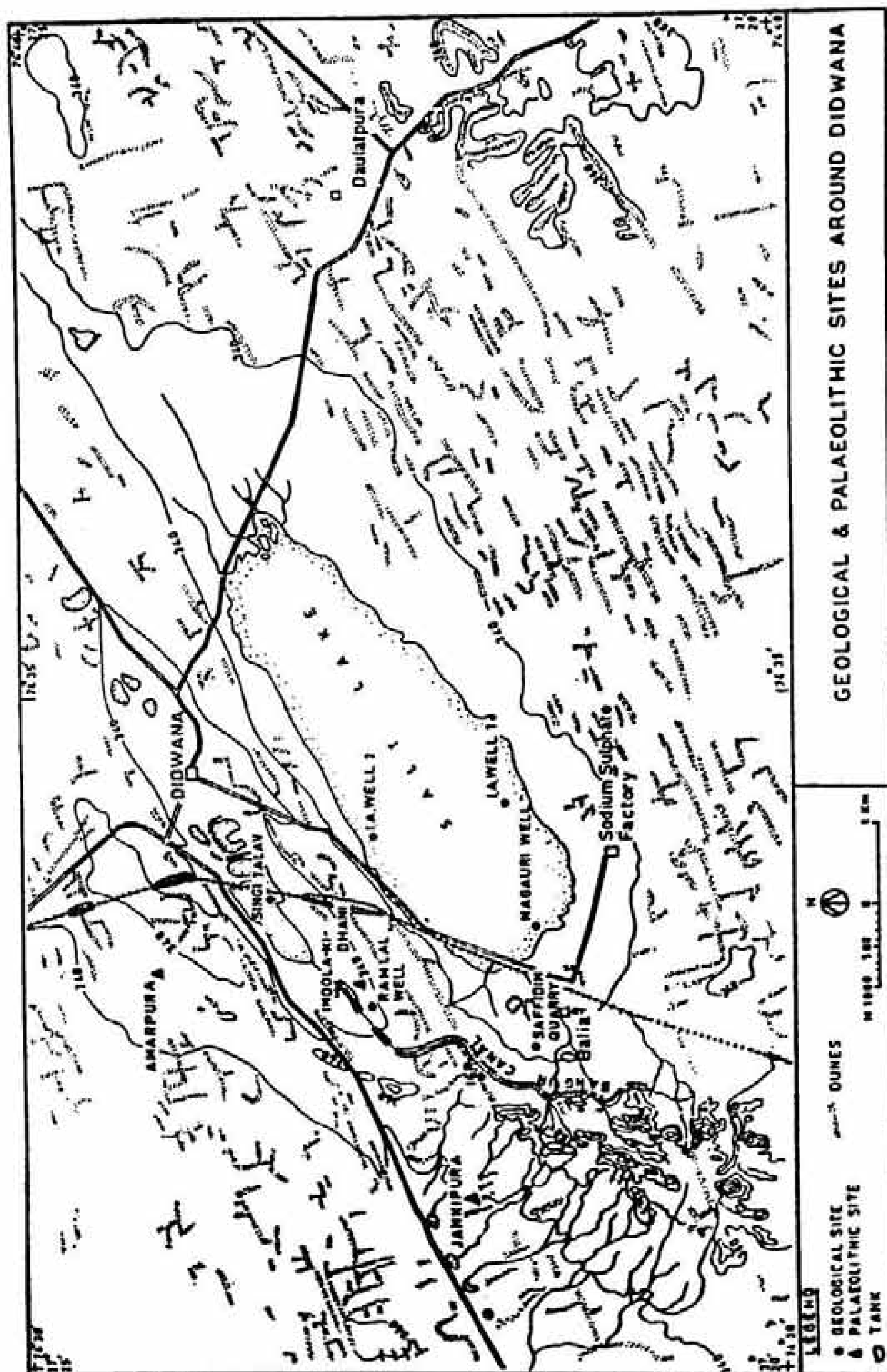

GEOLOGICAL & PALAEOLITHIC SITES AROUND DIDWANA
DIDWANA
Daulatpura
Sodium Sulphate Factory
NAGAURI WELL
SINGI TALAV
AMARPURA
RAM LAL WELL
SAFFIDIN QUARRY
CANAL
DUNES
LEGEND
GEOLOGICAL SITE
PALAEOLITHIC SITE
TANK

Fig. 13

three units arc also seen in Ram Lal's well, 1 km north-east of 16 R Point, while Units I and II arc found to be disconformably resting over strongly *kankarized* greyish green loam at several places in the area.

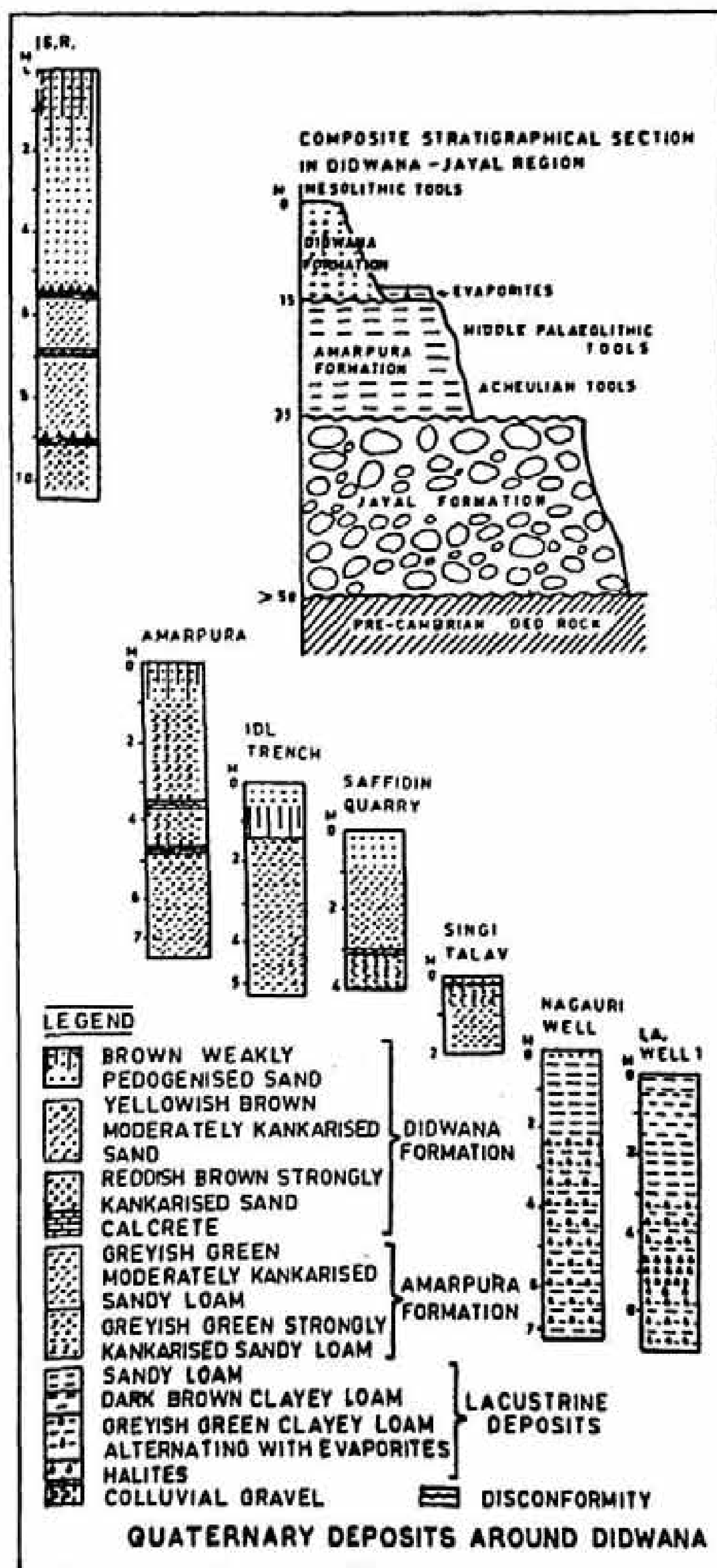
Large number of *mud* and limestone quarries, tanks and wells were investigated, including several wells in the lake beds at Didwana, Tal Chhapar, Kuchaman and Malhar for collecting stratigraphic information. Considering all this information along with that collected in the last four years in Nagaur and adjoining districts it is now possible to reconstruct the palaeoclimatic, palaeo-hydrological and archaeological story of the Thar Desert in general and Nagaur District in particular. Briefly the sequence that unfolds is as follows.—

The region under consideration emerged out of sea in the early Tertiary times, and since then it has been subjected to sub-aerial weathering and to erosional and depositional processes. Fluvial formations such as Jayal and Amarpura, aeolian formations represented by dunes and sand sheets, and salt lake deposits are the only superficial deposits present in the area. The palaeoenvironmental history of this region is, therefore, based on an understaning of drainage evolution and aeolian processes of the Cenozoic period.

The earliest traces of the ancient fluvial system are represented by the Jayal Formation of late Tertiary or Early Pleistocene age. The formation consisting of a 60-m thick well-rounded pebbly, bouldery gravel and interlayered by a 2-10 m thick calcrete is exposed as a resistant plateau-like surface between Jayal and Ladnun and between Khatu and Rol (fig. 12). It represents a high energy bed-load braided system having its origin in the Aravalli hills and probably flowing towards west-northwest. Anomalous occurrence of an extensive and high gravel ridge around Jayal indicates that the drainage system was technologically disturbed and uplifted some time during the Early Pleistocene. The rejuvenation of the area helped the streams to carve out deep valley into the Jayal Formation. It is probably during this stage of the drainage-history that Acheulian man arrived in the area. His cultural remains are found in the form of rich stone tool assemblages at numerous places on the surface of the Jayal ridge and in the flood loam deposits of Amarpura Formation. The post-Jayal Formation drainage system is represented by low gradient highly senuous streams with their wide flood plains and associated pools and lakes. These flood-plains were occupied by Palaeolithic man for a long time, probably from the Middle Pleistocene to early Late Pleistocene. The abundance of *kankar* beds in various forms and presence of mottling in clay loams indicate that the climate was essentially hot semi-arid throughout this long period of occupation.

The drainage system represented by Amarpura Formation existed in a critical hydro-climatic situation. It had its catchment in a relatively low Aravalli range getting less rainfall than in its southern counterpart where the Luni and its tributaries originate. Secondly, it did not receive water from the Himalayas as the Sutlej and the Ghaggar did. Due to these hydrological factors relatively minor tectonic and climatic changes of the Late Pleistocene were able to bring about the disorganization of this sluggish system, thus giving rise to playas and dunes of Didwana Formation. The stoppage of through-flowing drainage some time in the early Late Pleistocene must have forced Palaeolithic men to move further south into the Luni valley where streams continued to flow throughout the Late Pleistocene and the Holocene. The presence of abundant Middle Palaeolithic sites in the middle Luni valley supports this view.

Preliminary field studies and bore-well data from Sambhar, Kuchaman, Didisana and Tal Chhapar salt lakes show that the depth of the bed-rock below the present surface of these lakes varies from 7 to 20 m and the playa sediments conformably grade to fluvial sediments of Amarpura Formation. It is therefore clear that the playas in this area are situated in an ancient flood-plain represented by Amarpura Formation. As in the case of Pachbhadra where the salt lake is situated in abandoned channel of the Luni, these lakes represent remnants of flood-plain lakes which got isolated due to the total stoppage of through-flowing drainage system. This geomorphological change triggered the aeolian activity in this region represented by Didwana



I6.R.
COMPOSITE STRATIGRAPHICAL SECTION
IN DIDWANA - JAYAL REGION
MESOLITHIC TOOLS
DIDWANA FORMATION
EVAPORITES
MIDDLE PALAEOLITHIC TOOLS
AMARPURA FORMATION
ACHEULIAN TOOLS
JAYAL FORMATION
PRE-CAMBRIAN OED ROCK
AMARPURA
IDL TRENCH
SAFFIDIN QUARRY
SINGI TALAV
NAGAURI WELL
LA. WELL 1
LEGEND
BROWN WEAKLY PEDOGENISED SAND
YELLOWISH BROWN MODERATELY KANKARISED SAND
REDDISH BROWN STRONGLY KANKARISED SAND
CALCRETE
DIDWANA FORMATION
GREYISH GREEN MODERATELY KANKARISED SANDY LOAM
GREYISH GREEN STRONGLY KANKARISED SANDY LOAM
AMARPURA FORMATION
SANDY LOAM
DARK BROWN CLAYEY LOAM
GREYISH GREEN CLAYEY LOAM ALTERNATING WITH EVAPORITES
HALITES
LACUSTRINE DEPOSITS
COLLUVIAL GRAVEL
DISCONFORMITY
QUATERNARY DEPOSITS AROUND DIDWANA

FIG. 14

Formation. The relationship between playas and surrounding dunes is not yet clearly known. The presence of halite beds in the Didwana salt lake and of evaporites in all the salt lakes indicates that these lakes were carrying highly saline waters when dunes were actively forming in this region, probably during the terminal Pleistocene. This period was one of the driest climatic phases in the history of western Rajasthan. The paucity of Upper Palaeolithic sites in this region suggests that the area around Didwana in particular and the Thar in general was environmentally not conducive to human occupation during the terminal Pleistocene. The presence of dark brown evaporite-free clayey beds over evaporites in the salt lakes shows that the lakes were carrying fresh water, and the surrounding dune fields got stabilized due to vegetation growth during early Holocene. The climate at this stage was relatively wetter and provided congenial environment to Mesolithic man. Our findings thus confirm the conclusions of Allchin, Goudie and Hegde regarding the climatic and natural history of terminal Pleistocene while they are at variance with those of these scholars in respect of Early Pleistocene to early Late Pleistocene

92. EXPLORATION IN DISTRICT PALI.—R. Pathak of the Western Circle of the Survey in course of Village-to-Village exploration discovered stone images of Vishnu, Uma-Mahesvara, Vaishnavi and an inscribed memorial pillar at Pomawa. A *sati*-stone dated Samvat 1732 (AD 1675) was noticed at Dhola (Jagir) while Bithona yielded three inscribed memorials datable to to *circa* seventeenth-eighteenth century. Further, a Sun temple, assignable to *circa* fourteenth century AD was also located at Bithona. At Palri, temples dedicated to Siva, Vishnu, Ganesa and Parvati (*circa* fourteenth to sixteenth century AD) were discovered. Besides, loose-sculptures like Brahma, Ardhanarisvara, Siva, Ganesa and Sura-Sundari, a Siva temple and a a late medieval step-well were noticed at Pawa. Further exploration around the village Khimel yielded a Jaina Tirthankara figure, architectural components and a late medieval step-well.

SIKKIM

93. EXPLORATION IN DISTRICT EAST AND NORTH SIKKIM.—K. D. Banerjee assisted by A. K. Sharma, S. S. Gupta, A. J. Nambiraju, J. S. Dubey, A. Bandyopadhyaya and K. S. Venkatramiah of the Survey carried out exploration with a view to ascertaining prehistoric potentialities of the Sikkim region which had remained unattended so far.

Exploration was first conducted in North Sikkim along the river Tista and its tributaries from Lachen and Lachung in the north to Kikchu in the south. A variety of polished neolithic tolos (pls. XXX and XXXI A) were recovered from Djangu area on the right bank of the Tista. Tools were recovered from the following villages/sites in North Sikkim.—

Village/site	*Cultural assemblage*
Barpak (27°31 '30* N; 88°28'25" E)	perforated celts, Hunan knife and axe
Gnon (27°26'40"N;88°29'E)	axe
Gor-terang (27°25'30"N;88°30'l(r E)	axe
Gytong (27°29'10"N;88°3ri0"E)	adze

Village/site	*Cultural assemblage*
Lingden (27°32'40"N; 88°27'50" E)	harvesters
Lingdong (27°30'35" N; 88°33'10"E)	axe and adzes
Lingthen (27°31 '20" N; 88°28'30"E)	adze
Linkyong (27°24' N; 88°29' E)	axe and adze
Manshitang (27°40' N; 88°35'30" E)	polisher
Sangdong (27°27'30" N; 88°30" E)	perforated celt and adze
Sankalong (27°30'20"N;88°32'50"E)	adze
Terang (27°26'10"N;88°30'30'E)	adze

Tools comprised 2 harvesters, 1 knife, 7 axes, 13 adzes, and 3 single-and double-perforated celts. Among the tools, adzes are predominent. Almost all the tools are made on shale except a few on fine-grained basalt. Both medium and small varieties, with square or rounded butts and rectangular or ovoid cross section, have been found. Majority of the tools have been ground and polished all over the body while few only at the lower half. Special mention may be made of beautiful single-eyed harvester and a Hunan knife. A polisher having three concave working sides and a perforation on the top was recovered from a village north of Chungthan on way to Lachen. It is interesting to note that except the polisher no tool was recovered from the area north of Mangan.

A short exploration in East Sikkim around Pakhyong yielded neolithic tools (pl. XXXI B) from the following sites.

Village/site	*Cultural assemblage*
Pakhyong (27°14'30" N; 88'36' E)	adzes and axe
Shamsing (27°15'10' N; 88°36'20" E)	adzes, axe and polisher

The collections from Sikkim reveals south Chinese influence.

Pottery is significantly absent on the sites explored; in such a landscape one does not expect proper earth for the manufacture of pottery. Even the present population of North Sikkim do not use any pottery. Before the arrival of aluminium or other metal utensils, the people used to have their vessels made of wood. These wooden vessels were plastered with mud and then used for cooking. For storage of liquids hollow internodes of bamboo were used.

The local population have a magical concept about these neolithic tools. These arc considered as source of betterment of material life. Locally these are called *vajra-dunga,* meaning lightening stones due to the fact that they are generally found after the rainy season in terraced fields.

TAMIL NADU

94. EXPLORATION IN DISTRICT CHINGLEPUT.—B. K. Sinha, of the Southern Circle of the Survey, discovered Lower Palaeolithic tools at Vadakapattu, Karnaitanga, Malaiputtu and Eltchur, all in Sriperumbudur Taluk. The tool-types include handaxes and cleavers, of comparatively smaller sizes, unifacial and bifacial choppers, and notched scraper. A solitary Mesolithic site was discovered by him in the vicinity of the village Sengunram of the same Taluk. The tool-types include a variety of scrapers and a few points and cores recovered mostly from the surface.

K. P. Poonacha noticed a Late Stone Age site on the top of a hillock to the west of the panel known as 'Arjuna's penance' at Mahabalipuram. Tools recovered exclusively from surface include scrapers, points and cores made on quartzite.

Sivananda Venkata Rao in the course of his exploration discovered in the vicinities of villages Palveri, Guruvinmedu and Pinaiyur sites containing Megalithic cairn-circles, in addition to dolmen-cist burials at the last-mentioned site. A few early medieval sites, as attested to by the evidence of pottery, were discovered near Pudupakkam, Ariyambakkam, Tollai and Vadakapattu villages. Near the village Pallambakkam, a site locally known as 'Nattam' belonging to late medieval period, was also noticed.

95. EXCAVATION AT ADIYAMANKOTTAI, DISTRICT DHARAMPURI.—The Department of Ancient History and Archaeology, University of Madras, conducted excavation at the site under the direction of K. V. Raman, assisted by A. Swamy, S. Gurmurthi, P. Shanmugam, A. Ekambaranathan, R. Ponnuswamy, beside the students.

Period I *(circa* 100 BC to AD 200) is characterized by the occurrence of black ware, Black-and-red Ware and bright red-slipped ware. Some painted black-and-red ware sherds with criss-cross pattern were also met with. Antiquities of the period include iron nails, pieces of shell bangle and hopscotches. This is the Megalithic phase of the site.

Period II *(circa* AD 200 to 900) is marked by the presence of coarse red ware and a few black and Black-and-red Wares including a brick structure (brick size: 37 x 19 x 6 cm) with post-holes at regular interval. Noteworthy finds of the period are terracotta human figurines, glass bangles and paste beads, besides iron objects like nails and beads.

Period III *(circa* AD 900 to 1800) is represented by course red ware. Most important finds of the period are a terracotta female figurine with a parrot or dove in left hand and a small steatite image of Ganesa.

96. EXPLORATION IN DISTRICT NORTH ARCOT.—Hanumanthapa Telagu of the Southern Circle of the Survey in the course of his exploration discovered Neolithic sites at Lagattupallam and Ambur located at the foot-hills of Kattukollai and Dadi hills respectively. They yielded stone axes, chisels, mullars or hammer-stones, sling balls, besides borers and scrapers. The third site was noticed at Pannagaram associated with grey ware and tools; the mound here, having a deposit of 1 to 1.50 m, extends over an area of about 8 hectares.

Megalithic cairn-circles, ranging in diameter from 5 to 10 m, were noticed near Vinnamangalam. Disturbed urn-burials associated with typical Megalithic pottery were also noticed. Exploration further yielded Megalithic habitational sites at Usur, Sotavaram, Kilarasampattu, Sedurali in Vellore Taluk.

Rock-cut caves were located at Sarakkumparai and Perumagai hills while red ware and black ware assignable to historical times were noticed at Sembcdu and Torappadi, all in Vellorc Taluk.

Other sites yielding loose sculptures, hero-stones, temples and structures arc listed below.—

Village/site	*Cultural assemblage*
Abdullapuram	a burnt brick structure as Abdur-ka-mahal
Ambur (town)	temples and loose sculptures
Chinnasomeswaram	ruined temple
Kilmanavur	Jyeshtha and three other sculptures
Mandavelli	uninscribed hero-stone
Melmanavur	Siva temple
Pallikonda	Seshasayi Vishnu temple
Pennagaram	a Jaina Tirthankara image of the Chola period
Sathuvachari	Kodandaramasvami temple
Sembedu	sculpture of Vishnu
Simakampattu	two hero-stones, one being inscribed
Solavaram	temples and loose sculptures
Telur	temples and loose sculptures
Thimmapettai	Vishnu temple
Tutipattu	Bindumadhavaraya (Vishnu) temple
Virinjapuram	temple with two *kalyana-mandapas*

UTTAR PRADESH

97. EXPLORATION IN DISTRICT AGRA.—In the course of his exploration Krishna Kumar of the Department of Archaeology, Government of Uttar Pradesh, noticed the ruins of a mud-fort and fragments of medieval sculptures.

98. EXCAVATION AT FATEHPUR SIKRI, DISTRICT AGRA.—In continuation of the last year's *{1979-80,* pp. 71-72) work excavation was resumed under the joint collaboration of the Survey and the Aligarh Muslim University. The work was conducted under the general supervision of Munira Khatoon assisted by Arun Kumar and Sushil Kumar of the Survey and directed by R. C. Gaur, of Aligarh Muslim University, assisted by J. M. Siddiqi, K. K. Mohammad, Syed Husan Haider, Mohd. Shami Alam, Mohd. Abid, Mohd. Zahid Hashmi and Q,. Z. Usmani of the University.

Excavation was carried out between Dewan-i-Am and Agra Gate with a view to (i) trace the original road of Akbar's period including the nature and plan of structures on either side of the road and (ii) expose the structural remains in the courtyard of the so-called mint house to correlate them chronologically. Four crossroads with secondary roads and structural remains flanking the road came to light. It is observed that harder stones were used for the construction of roads and sandstone for structural construction. It was further noticed that well-maintained crossroads directed towards city-gates and passing through residential areas and markets joined

the main road at four places. There were two types of roads: (i) main road (width about 15.4 m) and (ii) secondary roads (width 3.65 m). A grid pattern of road net-work was planned. The thickness or packing of the road varied between 34 and 50 cm. The stone boulders were dressed in wedge-or tooth-shape and set in mortar in such a way that the thinner and sharper ends remained always below. This provided better strength and stability to the road. Soil analysis indicated that base course consisted of soil mixed with stone aggregate having about 60% of silica, 13% calcium oxide and 11% iron and aluminium oxide together.

The shopping-complex flanking on either side of the road looked uniform and homogeneous. At least 175 shops were located on either side of the road between Chahar Suk and Agra gate. Shops may be grouped into two types: (i) those having a platform (width 1.6 m and height 40 cm) along the road; and (ii) those without platform. Those having platform were followed by gallery (width 1.8 m and height 80 cm) which was a pillard verandah, where the shopkeeper sat before their displayed items. The main stores (cells) were made of dressed stone blocks of varying sizes. At places, remains of floorings were noticed. Other noteworthy remains include artistically-chiselled bases of stone pillars, pilasters, brackets, lintels etc. The evidence of broken beam may indicate the prevalence of flat-roofing.

Trial-digging adjacent to *daftar* revealed the remains of a *hamam.*

Among the antiquities mention may be made of a glazed ware with decorations, apart from stone, terracotta and iron objects, as reported earlier.

99. EXCAVATIONS AT SRINGAVERAPURA, DISTRICT ALLAHABAD.—In continuation on the the last year's work (*1979-80,* p. 74) the excavations were resumed here by the Excavations Branch II of the Survey in collaboration with the Indian Institute of Advanced Study, Simla, under the project 'Archaeology of the Ramayans Sites'. The work was directed jointly by B. B. Lal and K. N. Dikshit, assisted by B. P. Saxena, V. G. Sharma, R. S. Sharma, S. K. Sharma, L. S. Mamani, B. B. Sharma and D. K. Malik of the Branch and Shri S. K. Srivastava of the Institute. It may be recalled that the tank was fed by the water of the Ganga through a nullah and a channel deliberately cut into the natural soil connecting the nullah with the tank-complex. The excavations this year were conducted to find out the details of this 'feeding channel' as also the further extent of the tank-complex towards the south

The feeding channel was found to measure about 16.30 m in width at the top, narrowing down to about 2.70 m at the base, at a depth of about 5.40 m from the top. In its section were seen layers of silt brought by the river, of *kankar*-nodules washed down from the sides of the channel itself, and stray bricks brought down from the tank proper with the receding water. Through the channel the Ganga water first got into two silting chambers (A & B), again cut into the natural soil. The full outlines of these chambers are, however, still unclear.

A part of silting chamber 'B' was lined with kiln-burnt bricks, forming the arc of a circle (*1978-79,* pl. XXVI). About the middle of this arc was an inlet channel, lined with kiln-burnt bricks, through which the water entered the tank. This channel was slightly curved and consisted of two parts, measuring 1.60 m and 2.60 m in width, thus allowing for a gradual spread of water. The sides of the channel were further strengthened by crosswalls at the back. In order to ensure that the water gushing into the tank did not erode the side-walls, structural wings were also provided on either side. Lower down, a silt was seen and it is probable that in its was inserted a wooden rafter so as to reduce the eroding effect of the water on the brick-work. At the point of the fall of the water on to the base of the tank, a small pavement consisting of two courses of of large-sized brick was found. It was also observed that the tanks were provided for what in modern technical parlance is known as 'horizontal' and 'vertical warping'; the retaining walls of the tank were splayed out horizontally as well as sloped backwards, by which device the thrust of the water was considerably reduced.

Tank B was found to be further continuing towards the south. The platform and staircase on the western side of inter-connecting channel were duly identified, though most of the steps were found damaged. It appears that the western side of the Tank B suffered heavy damage through the onrush of water. Thus, besides the platform and staircase just referred to, the middle and upper retaining walls of the tank in this part were also largely washed down. However, it is interesting to note that a chunk of the middle retaining wall was found bodily shifted a little distance away. During the course of the excavation of Tank B, subsoil water had already been encountered earlier, near the bottom. However, an interesting feature noticed this year was the presence of circular wells (diameter about 70 cm) at the bottom of the tank. It appears that these wells were provided to allow free flow of the subsoil water upwards so that the tank did not run dry even during the hot summer months. At a distance of about 35 m from the north-eastern corner of the Tank B two flights of steps, one opposite the other, descended on to the top of a platform where starts a sloping ramp, made of bricks set on their edges. This brick-on-edge ramp, which is about 4.75 m in length and 2.85 m in width, is not monotonous but has a criss-cross pattern of layout. The ramp leads down to a set of three steps reaching the bottom of the tank. The base of the ramp must be having some wooden support as it appears from the silt in the adjoining structure.

In the few trenches that were laid to the south of the ramp at a distance of 25 m and 60 m, the retaining walls of the tank were found running. Moving further south along this alignment the mound shows a downward trend and it is likely that underneath this slope lie the remains of a 'waste weir', if any.

Among the antiquities found from the tank, mention may be made of a few more fragments of terracotta figurines of Hariti and of a few terracotta miniature lamps.

100. EXPLORATION IN DISTRICT ALLAHABAD, FATEHPUR AND JAUNPUR.—Under the Village -to-Village Survey scheme Devendra Nath Tiwari and Om Prakash Pandey of the Department of Ancient History, Culture and Archaeology, University of Allahabad explored the following sites of archaeological interest.—

District	*Site*	*Cultural assemblage*
Allahabad	Madva	Northern Black Polished Ware
-do-	Ranipur	Northern Black Polished Ware
Fatehpur	Ailahi	sculpture
-do-	Aimatpur	terracotta
-do-	Amani	terracotta
-do-	Amni Garha	Northern Black Polished Ware and black-slipped ware
-do-	Asini	sculpture
-do-	Asothar	sculpture
-do-	Baundar	sculpture
-do-	Budraman	sculpture
Fatehpur	Budwah	sculpture
-do-	Ekdala	sculpture and Saka-Parthian terracotta
-do-	Fatehgarh	Northern Black Polished Ware and black-slipped ware
-do-	Garha	terracotta
-do-	Husainganj	Northern Black Polished Ware:, black-slipped ware and sculpture

District	*Site*	*Cultural assemblage*
Patch pur	Kabra	Northern Black Polished Ware and black-slipped ware
-do-	Kaundar	sculpture
-do-	Khoga	sculpture
-do-	Kishanpur	sculpture
-do-	Majhilgaon	sculpture
-do-	Manwa	Northern Black Polished Ware and black-slipped ware
-do-	Painagarh	sculpture and terracotta
-do-	Purain	sculpture
-do-	Pure Buzurg	Northern Black Polished Ware; black-slipped ware and sculpture
-do-	Raipur-Bliasrual	Northern Black Polished Ware; black-slipped ware and sculpture
-do-	Rari	sculpture
-do-	Sarsai	sculpture
-do-	Ukathu	sculpture
Jaunpur	Madavdih	Northern Black Polished Ware
-do-	Sarai	Northern Black Polished Ware

101. EXCAVATION AT KHERADIH, DISTRICT BALLIA.—K. K. Sinha and Birendra Pratap Singh of the Department of Ancient Indian History, Culture and Archaeology, Banaras Hindu University, undertook excavation at Kheradih with a view to ascertaining the cultural sequence of the site. The excavation revealed a two-fold cultural sequence: Periods I and II with a sub-division in the earlier as Phases I and II.

Phase I of the Period I (*circa* sixth century to fourth century BC) is characterized by the occurrence of the Northern Black Polished Ware along with red, grey, black-slipped and black-and-red wares. Main shapes are represented by straight, convex and spherical-sided bowls and dishes with incurved, straight and convex sides. Bowl is the only type in black-and-red ware of medium thickness having gritty core. No painting was noticed.

Phase II of Period I (*circa* third century to second century BC) represented by general deterioration in the pottery fabrics, particularly in the grey ware which recalls similar one from Rajghat I C. However, black-and-red ware was conspicuously absent.

The antiquities discovered include iron nail, frying shovel, a few copper pieces, bone points etc.

The structural activity is marked by the presence of a floor made of brick-jelley mixed with earth. Evidence of plaster made of lime and sand was also noticed.

Period II (*circa* second century BC to second-third century AD) is represented by red ware belonging to the Sunga-Kushana level. Limited excavation also revealed some indeterminate burnt brick structures. Noteworthy finds of the period include: a coin with a legend (*Ra*)*tmadatasa* palaeographically assignable to first century BC; and two terracotta sealings with the legends *Vachodamas* and *Srivada* (*T*) *ma putrsya Kumaranaga (sja)* respectively in the script datable to first century BC and second-third century AD reopectively. Other finds of the period

include terracotta animal and human figurines, beads, flesh rubber, wheel, dabber, iron-nail and copper objects.

102. EXPLORATION AT CHITRAKUT, DISTRICT BANDA.—B. B. Lal of the Indian Institute of Advanced Study and K. N Dikshit of the Archaeological Survey of India assisted by V. C. Sharma and L. S. Mamani explored the left bank of the Mandakini, a tributary of the Yamuna. It was observed that most of the temples and the old-township of Chitrakut arc situated over the ancient habitation. In the area just behind the Yajnavedi temple, black-slipped ware, the Northern Black Polished Ware and associated red wares were picked up. A few red ware sherds belonging to later periods were also noticed.

103. EXPLORATION AROUND MANIKPUR, DISTRICT BANDA.—P. C. Pant and Sunil Kumar assisted by Ravindra Kumar and Santosh Saran of the Department of Ancient Indian History, Culture and Archaeology, Banaras Hindu University conducted exploration around Manikpur yielding Megalithic sites at Bagdari, Sarhat and Nihi.

The Megalithis, located at the foot and slope of hills, were usually strewn with large number of pot-sherds, glass bangles, glass and iron slags, fragments of querns, rotary querns and iron objects.

With a view to ascertaining the nature of the burials, two from each site at Bagdari and Sarhat, were opened. Pits dug into the natural soil contain mostly red ware, bangles and charcoal. One of these yielded extremely decomposed piece of bone. Pottery types are represented by globular pots, and a few bowls and basins. The entire structure, including the pits, was covered by low cairn.

A new feature was observed in one of the Megaliths at Sarhat yielding small floor made of stone fragments resting against a stone-built wall. Two small pits on the floor contains earthen pots, one superimposed over the other along with a good amount of charcoal. One of the two pits also yielded monochrome and bichrome glass bangles, thereby suggesting post-cremation burial of a male and a female.

One the basis of pottery the Megaliths may be dated to the early centuries of the Christian era.

Further exploration yielded a group of rock-shelters, some of which contain paintings. Besides, microliths and beads were encountered inside and outside the shelters.

104. EXCAVATION AT MORADHWAJ, DISTRICT BIJNOR.—K. P. Nautiyal assisted by B. M. Khanduri, Venod Nautiyal, D. L. Rajput, Ramesh Khanduri, B. B. S. Rawat and P. R. Sanwal resumed excavation at Moradhwaj with a view to ascertaining the vertical cultural profile of the mound. Besides conducting excavation in MRD-4, a new trench, MRD-7, was laid near the modern Siva temple.

It is now clear that the brick structure of the Kushana times (Period II B) is a temple with a sanctum and a *mandapa* with a circumambulatory path. It had two phases of building activity and in the second phase dividing walls were added to the *pradakshina-patha,* thereby suggesting its disuse during the period. A wall measuring 22.70 m x 1.85 m running east-west is an important discovery of this year. A square room, about 2-62 m sides, perhaps meant for the priest or some person related to the temple was laid bare at the eastern flank of the wall.

The excavation in MRD-7 brought to view the remains of the stupa, the presence of which was surmised by Cunningham in 1863. Small tablets bearing the image of Buddha were recovered in plenty. The stupa also belongs to the Kushana times.

105. EXPLORATION IN DISTRICT BIJNOR.— C. B. Mishra of the Northern Circle of the Survey during the course of his exploration under Village-to-Village Survey scheme discovered

sites at Kishan Bagh, Manshapur, Muzzampur Sujan, Rajarampur, Saidullahpur yielding pottery ranging from early centuries of the Christian era to medieval times. A terracotta plaque of Mahishasuramardini constitutes an important find.

106. EXPLORATION IN DISTRICT ETAH.—In course of his exploration Krishna Kumar of the Department of Archaeology, Government of Uttar Pradesh, at Rajor noticed a number of architectural pieces like *amalaka,* cruciform brackets bearing figures of *Kichaka* and corner stones displaying *Dikpalas* etc. The site also yielded images of Vishnu, Kartikeya, Kubera, Durga, and Jaina Tirthankara like Adinatha etc. A *navagraha* panel depicting Ketu in full-fledged female form and Rahu in *tarpanamudra,* placed right over her head, is a notable antiquity.

Further exploration to the west and north respectively of the village Rajor yielded images of Seshashayi Vishnu, a weathered panel depicting Ekanama with Balaramsa, four-armed Vishnu in a modern temple and a door-lintel displaying a figure of Vishnu riding on Garuda flanked by *navagrahas.*

Besides, a few square-shaped sandstone pillars embellished with *ghata-pallava* motifs were noticed at Sakit.

107. EXPLORATION IN DISTRICT KANPUR.—L. M. Wahal of the Northern Circle of the Survey in the course of his exploration noticed the Northern Black Polished Ware along with grey, black-slipped and Sunga-Kushama red ware at Chanwar. An inscribed brick (in Brahmi character of first century BC/AD) was found at Musanagar. The village Rahiniyapur yielded the Northern Black Polished Wares and other wares belonging to early centuries of the Christian era.

108.—EXCAVATION AT HULAS KHERA, DISTRICT LUCKNOW.—In continuation of the last year's *(1979-80,* p. 77) work R. C. Singh assisted by Hem Raj and Rakesh Srivastava resumed excavation at Hulas Khera with a view to (i) expose the plan of the fortification; (ii) house-complex inside the citadel belonging to the Gupta period; and (iii) trace out the road assignable to the Kushana period built across the lake.

The gateway complex (2-69 m width), encountered in the middle of the western fortification wall, was characterized by projections on both the sides, a screen wall (14.30 x 1.75 m) and side entrance (2.00 m width). Both the entrances were provided with high door-sills of paved brick-bats, wooden door-frame fitted with sheafs and iron bolts. Staircases probably meant for soldiers guarding the defence were provided inside the fortification walls.

Structural activity comprising a brick-built residential complex was found surrounded by a 1-m thick boundary wall. Rebuilding activity was also noticed.

The Kushana period road was traced up to the length of 50 m.

Among the important antiquities, apart from pottery, mention may be made of terracotta moulded human figurines, inscribed seals and sealings, silver coins of the Gupta kings, metal objects like gold pendent and plaque, copper antimony rod, iron implements, beads of semiprecious stones, ivory and glass bangles etc. Other finds include fragment of a pillar capital, carved buff sandstone, an image of a lady holding a water vase, head of a male figure with frizzled hair-locks and seven-hooded serpent conopy.

109. EXPLORATION IN DISTRICT MAINPURI.—L. M. Wahal of the Northern Circle of the Survey in the course of exploration discovered the Painted Grey Ware, Northern Black Polished Ware, grey ware, black-slipped ware, black-polished ware, red ware variously of the early centuries of the Christian era and medieval times; Sunga-Kushana and Gupta terracottas from Kushmri, Nagla Dayal, Nagla Khera, Niroli and Sahan were also found.

110. EXCAVATION AT INDARI, DISTRICT MIRZAPUR.—G. R. Sharma, of the Department of Ancient History, Culture and Archaeology, University of Allahabad assisted by V. D. Mishra, B. B. Mishra, Ranjit Singh, Kamalakar Thakur and M. C. Gupta conducted excavation at Indari with a view to ascertaining the nature of the neolithic deposit.

The excavation yielded 71-cm thick neolithic settlement divisible into five layers. The pottery is characterized by chord-impressed, rusticated and burnished red and burnished black wares along with microliths on chert and chalcedony. Pottery types include bowls with convex, tapering or straight sides, vases with concave or sharply-carinated neck and shallow dishes and platter. The general assemblage of pottery is ill-fired and handmade. Excavations also brought to light traces of oblong plan of huts along with some post-holes. The floor of these structures was paved with hard red clay which yielded burnt clay lumps with wattle daub impression.

111. EXCAVATION AT LAHARIA-DIH, DISTRICT MIRZAPUR.—Vidula Jayaswal assisted by Post-graduate students of the Department of Ancient Indian History, Culture and Archaeology, Banaras Hindu University, conducted excavation in two rock-shelters in the vicinity of the village Laharia-dih in order to ascertain their habitational deposits.

The entire deposit in Rock-shelter 1 is divisible into three layers, the latest one (thickness 10 to 20 cm) yielding both wheel-made and hand made pottery along with microliths and bladelets. The preceeding layer (thickness 45 to 60 cm) is dominated by bladelets, both geometric (triangle) and non-geometric forms (lunate and backed bladelet). Hand made and worn out pottery became scrace at the lower levels. The earliest level was found overlying the bed rock and was devoid of pottery and geometric forms of microliths though non-geometric forms on bladelets continued.

Rock-shelter 2, about three kilometer from Lahari-dih village, yielded a deposit which is divisible into two layers: the upper one represented by microliths (both geometric and non-geometric forms), glass bangles, iron slags and wheel-made pottery, while the lower one marked by the presence of both handmade and wheel-made pottery, geometric microliths and bladelets. Besides, the floor of the shelter has yielded a few animal bones and an antler with cut marks aligned in north-south direction.

112. EXCAVATION AT MAGHA, DISTRICT MIRZAPUR.—G. R. Sharma, of the Department of Ancient Indian History, Culture and Archaeology, University of Allahabad assisted by V. D. Mishra, B. B. Mishra, Ranjit Singh, Kamlakar Thakur and M. C. Gupta undertook excavation at Magha with a view to ascertaining the structural features of Megalithic monuments, two cairns and three cist-burials were exposed, the other aim of the excavation being to find out their relationship with the habitation area.

Two excavated cairns-cirlces (designated Megaliths I and II) exhibit almost identical grave goods and constructional features. However, in the case of Megalith I red sandy soil cushion (thickness 3 to 4 cm) over the bed rock was an additional feature. The oblong burials, in east-west orientation, were marked by the presence of pottery and microlith. Megalith II yielded a few stone pieces and stone discs, besides red and black-slipped ware.

Simultaneously three cist burials (designated as Megaliths III, IV and V) were also excavated. Megalith III is a rectangular cist-chamber measuring 2 x 1.65 m at the top and 1.80 x 1.40 m at the bottom laid almost in the centre of a circular pit. The capstone was found dislodged. Three monolithic orthostats were located towards the south, north and the east but none on the western face. The grave goods include pottery, microliths, a few copper fragments, stone pieces and a few animal bones at different levels. After placing the capstone a cairn was heaped to a height of 75 cm from the present ground level. Megalith IV (pl. XXXII A) is represented by four upright monolithic slabs oriented east-west. The top and bottom measured respectively 1.90 x 1.55 m and 1.35 m. The grave goods were found placed at two different

levels, the lower level yielding potsherds, burnt clay-lumps and fragmentary animal bones within an oval-shaped area demarcated by stones, while the upper level potsherds, ring-stone, stone fragments, also within an oval area. The evidence of burning before the erection of the cairn was evident from the occurrence of burnt clay-lumps and ash. Megalith V (pl. XXXII B) is found in disturbed condition. The longer axis of the cist measuring 1.50 x 1.00 m is oriented east-west. The excavation revealed that the orthostats were surrounded by dry stone masonry wall battered towards the cist-chamber which yielded a few potsherds and two microliths on chalcedony.

The excavation at the corresponding habitational area yielded a single-culture deposit comprising typical pottery, microliths, querns, mullers and burnt clay-lumps with reed and bamboo impressions. The excavation also brought to light evidence of huts marked by the presence of post-holes. The floors of these huts were made of *murrain,* gravels and clay-clods rammed together.

The pottery consisted of red ware, black-and-red ware and black-slipped ware, the majority being wheel-made though handmade pottery was also available. The shapes include bowls, dishes, basins, medium-size vessels, storage jars, cooking vessels footed and perforated vessels, beakers with cylindrical profile, button-based goblet and funnel-shaped lids.

113. EXPLORATION IN DISTRICT MIRZAPUR.—The Department of Ancient Indian History, Culture and Archaeology, Banaras University, under P. C. Pant, Subhash Rai and B. P. Singh assisted by Sunil Kumar and Santosh Saran carried out exploration on both the banks of the river Son, between the village Chatarwar and Chopan with a view to determining the nature of the Quaternary deposit and associated human culture. In all, five sections were examined on both the banks of the river Son. At Chaura an approximately 2-m thick cemented gravel, mainly composed of sedimentary rocks, was capped by a very thick sandy silt deposit. While the silt was sterile, some Middle Palaeolithic implements were encountered in the gravel deposit. A deposit of loose gravel and very coarse sand, often in the form of alternating layers, in place of cemented gravel was observed at Bijaura. Thin gravel layers yielded a fairly rich collection of Middle Palaeolithic artifacts. Though the right bank of the river Son at Chopan is more or less repetition of that of Bijaura, a thin layer of dark-coloured silt with occasional very small pebbles, located about 1.5 m from the top, has yielded very rich microlithic industry represented by lunates, triangles, and backed bladelet. The cross-bedded gravel-sand deposit mixed with the Middle Palaeolithic tools, though present in the section of the right bank is missing from the left bank section of the Son at Chopan. Here the 3.50 m thick section presents numerous alternating layers of silts, occasionally rich in iron oxides, and grey-coloured clays. In between the silts and the clays lies a stratum of egg-shells, nearly 1.7 m below the top surface. The silts are generally rich in calcium carbonate and contain some semi-fossilized bones of vertebrate fauna. Below the alternating silts and clays lies a thick sand deposit. None of the strata yielded any stone industry.

The slopes of the Makarwari Turra hillock, near the village Jamual, about 4 km south of Chatarwar, yielded a microlithic industries, associated with a limited number of potsherds of a coarse dull red ware.

A Megalithic site with nearly twenty cairns was located on the slope of the hillock Baghmania, about 2 km south of the village Chatarwar. They are of various dimensions, the largest being 13.2 x 8.3 m and the smallest 3 x 2.6 m. All of them are devoid of capstones. Some bladelets and fragmentary potsherds of a coarse red ware constitute other finds.

114. EXCAVATION AT HULAS, DISTRICT SAHARANPUR.—In continuation of the last year's work *(1979-80,* p. 82) excavations were resumed at Hulas under the direction of K. N. Dikshit of the Excavations Branch II of the Archaeological Survey of India, assisted by B. P. Saxena,

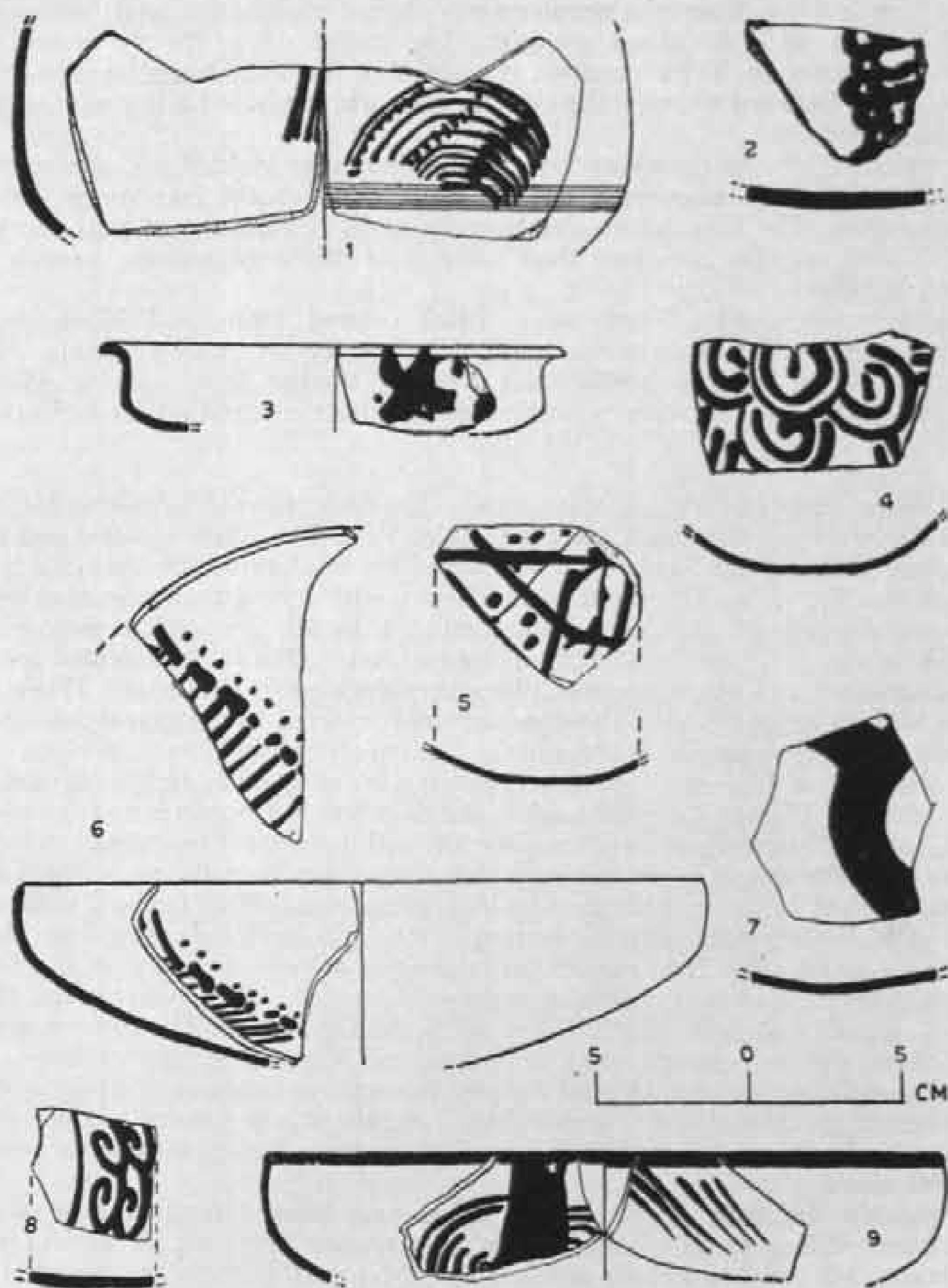


FIG. 15. *Hulas : Painted Grey Ware sherds*

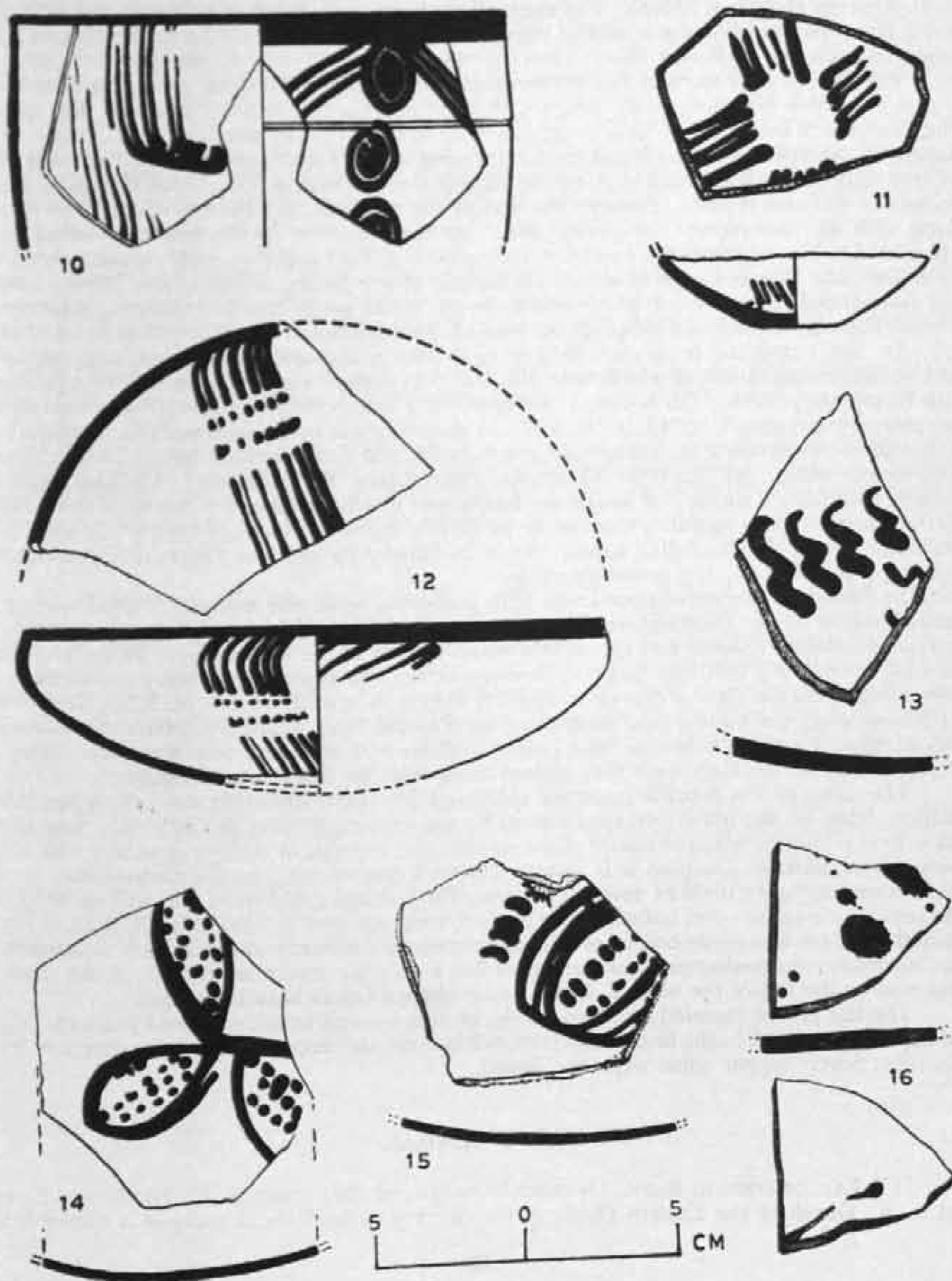


Fig. 16. *Hula : Painted Grey Ware sherds*

V. C. Sharma and D. K. Malik. The excavations were undertaken to ascertain the extension of the Harappan mud-platform and to know the nature and extent of the massive burnt brick structure belonging to Period IV.

The Period I of the site further revealed from habitational area successive floor-levels of rammed earth including burnt patches, circular hearths and remains of fallen mud-bricks. The floor levels interspersed with burnt layers were disturbed by the later circular pits. The Harappan mud-platform was found further running towards south and south-eastern side with a sharp slope towards the east. Against the base of the platform a thick burnt floor with burnt brick-bats was also noticed. Towards the end of the platform, the Painted Grey Ware sherds along with the iron objects were found overlying the platform. As the top was washed away either by flood or by rains, the overlying Painted Grey Ware deposit possibly come down from the higher side. The evidence of large-scale digging of pits having Painted Grey Ware material was also noticed. The practical purpose of these pits could not be determined during this current season. The relationship of mud-platform vis-a-vis habitational area still required to be worked out. An indeterminate terracotta object with two bifurcated curved terminals, as if of snake-hood, the examples of which were also found in earlier works, was noticed in a pit along with Harappan pots viz., a dish with a ring-base and a long bone piece. The pit was lined on the two sides by mud-bricks of 48 x 26 x 7 cm size, whereas other sides were found disturbed. Although the evidence is too meagre, its use for some ritualistic purpose cannot be overlooked. A terracotta sealing (pl. XXXIII A), bearing three signs of the Indus script was also found for the first time from a site as east as District Sharanpur which indicates the extent of this utilization. Amongst other antiquities mention be made of a terracotta humped bull (pl. XXXIII B), terracotta faience and carnelian beads, terracotta bangles having twin rings and indeterminate object (pl. XXXIII D) and potter's dabber.

In Period II successive floor levels with post-holes were also noticed. A good variety of painted motifs on the Painted Grey Ware were noticed (figs. 15-16). A bowl with a string-cut and flat disc-based painted and completely wheel-thrown in the Painted Grey Ware fabric and a neck-fragment of a bottle-necked pot were among the new types. A miniature terracotta lamp with a high pedestal' base is also interesting. A terracotta spindle whorl (pl. XXXIII C) with a perforation in the middle and painted in the Painted Grey Ware style, terracotta amulets, and bangles, a good number of bone points, styluses and antimony rods were also found. A large quantity of iron slags were encountered along with the fragments of crucible.

The massive burnt-brick structure of Period IV was further pursued. A yellow mud-platform lying on the inner side appeared to be the working level of this structure. Just above this yellow platform, near the centre of the mound, the remains of another structure with seven courses were noticed. On plan it is rectangular with one opening on the eastern side. It was found extending up to 10.00 m towards the east. The average thickness of the wall is 0.65 m. The structure is constructed out of mainly re-used wedge-shaped bricks (36 x 21 x 14 x 7 cm) while the eastern extensions consist of re-used fragmentary rectangular bricks. It is worth-noting that normally wedge-shaped bricks are used for a circular structure. In one of the modern structures at the top of the mound, burnt wedge-shaped bricks have been used.

The last period revealed moulded bowls, incense burners in red ware and jars with bright red slip. The walls of burnt bricks and mud-bricks were also encountered. A few furnaces were also seen. Seven copper coins were also found.

WEST BENGAL

115. EXPLORATION IN BASOL, DISTRICT BANKURA.—Subhra Bose, A. K. Bandhyopadhyaya and S. K. Ghosh of the Eastern Circle of the Survey noticed the remains of a ruined brick

temple over a mound on the right bank of river Kangsabati. Late medieval pottery has been found at the site, apart from a few microliths from the present river bed.

Subhra Bosc and A. K. Bandyopadhyaya also discovered an early historical mound at Brahmandcha on the left bank of the river Silavati, which yielded two Jaina images. Other finds include Puri-Kushana coins, sculpture and large number of red and grey wares.

116. EXPLORATION IN DISTRICT MALDA.—A. K. Jha of the Eastern Circle of the Survey in course of his exploration noticed sites at Sanjip, Domanbhed and Kaligaon yielding pottery, soot-stained *handi* in black-slipped ware and Mughal glared tiles.

117. EXPLORATION IN DISTRICT MIDNAPUR.—P. C. Das Gupta and S. G. Mukherji of the Department of Archaeology, Government of West Bengal, discovered at Barakhula a Late Stone Age site represented by blades, burins and a core of chert.

P. C. Das Gupta and E. D. Sampson collected early historical pottery and a terracotta toy-cart assignable to the Kushana period from Delhi Bahiri.

P. C. Das Gupta and R. K. Ghosh discovered early medieval pottery and terracotta tablet inscribed in old Bengali characters of *circa* sixteenth century AD from Raghunathbari.

118. EXPLORATION IN DISTRICT 24 PARGANAS.—P. C. Das Gupta and E. D. Sampson of the Department of Archaeology, Government of West Bengal, in the course of their exploration collected at Chakher Para pottery characterized by dishes in black and grey wares, vases bearing basket impressions in red ware and lids and terracotta lamp. The same party discovered early historical pottery at Dabu on the river Matla, apart from a partly-fossilized teeth of an animal.

119. EXPLORATION IN DISTRICT PURULIA.—Subhra Bose and A. K. Bandyopadhyaya of the Eastern Circle of the Survey noticed the remains of a group of stone temples over a mound at Pakbirra. A few of them have recently been reconstructed while the rest are available up to the plinth level. However, a large number of sculptures representing the images of Jaina Tirthankaras were stored in a hut by the local people. The noteworthy collections are a 2.5-m high standing image of Rishabhanatha, figures of different Tirthankaras, Ambika with her consort, Jaina votive stupas, slab depicting rows of Tirthankaras, carved door-jamb etc.

The same party in course of exploration also noticed on the left bank of the river Kangsavati an extant remains of a small *triratna* temple.

II. EPIGRAPHY

SANSKRITIC AND DRAVIDIC INSCRIPTIONS[1]

ANDHRA PRADESH

1. INSCRIPTION, KAMAGIRI, DISTRICT ADILABAD.—Dated in the Saka year 1051, this record, in old Nagari characters and in Marathi language, refers to the name of the donor as Jagaddeya, who may be identified with the one bearing the same name of the Paramara dynasty. This record seems to be a copy of the one already available from the Jainaad village of the same District.

2. Two BRAHMI INSCRIPTIONS, AMARAVATI, DISTRICT GUNTUR.—Both the inscriptions are in Prakrit language and Brahmi characters: one, in two lines, engraved on an *ayaka* pillar from Vaddamanu, about 10 km from Amaravati and now preserved in the office of the Police Patel of the village, is in the characters of third-second century BC and reads *utarodasa thabho* ('the pillar is donated by Utaroda'); the second engraved on a damaged pillar near the figure of a faintly-carved hooded serpent, now kept in the Archaeological Museum, Amaravati, is in nail-headed southern Brahmi characters of about the third century AD and reads *Nagashia.*

3. INSCRIPTION, KALLUGUTLA, DISTRICT KURNOOL.—Dated in the Saka year 1686, the record refers that Gurivi Setty, grandson of Lingaraviragi Setty and son of Ramgi Setty who hailed from Penugonda area, had constructed a Siva temple at Kallugutla.

4. INSCRIPTION, NAGALOTY, DISTRICT KURNOOL.—Dated in the Saka year 1537 (AD 1614), the inscription refers to the repair made to the eastern *gopura* and compound wall of the Nagalooty Virabhadrasvami temple by Nagi Setty and son of Peddits Setty of Penugonda when Srivira Pratapa Srivira Ramadevaraya was ruling from the Penugonda area.

5. INSCRIPTION, POLEPALLI, DISTRICT MAHBUBNAGAR.—This inscription, dated in AD 1091, mentions Vimaladitya, a Kalyani Chalukya king, as a patron of Jainism.

6. WESTERN CHALUKYAN INSCRIPTION, GAUDACHERLA, DISTRICT MEDAK.—Belonging to the time of Trailokyamalla Somesvara of the Western Chalukyas and dated the Saka year 986, the record, which is a *prasasti,* states the existence of a hitherto unknown feudatory by name Chandra Sekhara Chola of the Telugu Chola family.

7. INSCRIPTION, MULUGU, DISTRICT MEDAK.—Dated in the Saka year 987, the record refers to Asgamarasa with the title *maha-mandalesvara.*

1information from: 1, 3 to 12 Director, Archaeology and Museums, Government of Andhra Pradesh; 15 K. M. Momin of the Department of Ancient History and Archaeology, M. S. University of Baroda; 17 D. R. Gehlot of the North-western Circle of the Survey; 18, 27 and 30 Southern Circle of the Survey; 19, 21 to 23 Director, Archaeology and Museums, Government of Karnataka; 24, Director, Archaeology and Museums, Government of Madhya Pradesh; 25 Shobhana Gokhale of the Deccan College Post-graduate and Research Institute, Pune; and the rest from the Chief Epigraphist of the Survey, Mysore.

8. RASHTRAKUTA INSCRIPTIONS, VARGAL, DISTRICT MEDAK.—These records are written in red ochre on a huge boulder of the hillock. These are label inscriptions written in the Hale-Kannada characters of about eighth-ninth century AD.

9. KAKATIYA INSCRIPTION, MATOOR, DISTRICT NALGONDA.—This inscription belonged to Rudra, an ancestor of Ganapati of the Kakatiya dynasty.

10. RASHTRAKUTA INSCRIPTION, VELAMAJALA, DISTRICT NALGONDA.—Out of four inscriptions engraved in the Hale-Kannada script and belonging to the Rastrakuta king Krishna, the two records the gift of lands to the Jaina *basadi* made by Ravichandra, a military officer of the king.

11. INSCRIPTION, INAVOL, DISTRICT WARANGAL.—Dated in Saka year 998 (AD 1076) and the cyclic year Nala, it is issued a few month before Vikramaditya VI, who overthrew his brother Somesvara II.

12. RASHTRAKUTA INSCRIPTION, INAVOLU, DISTRICT WARANGAL.—This record is written in Hale-Kannada script of the tenth century AD and the donor, holding the offices of *angaraksha* and *tantrapala* in the services of the king Satyasraya, was none other than the Rashtrakuta king Krishna III, the name and titles suggesting connections with the *prasasti* of the Badami Chalukyas.

GUJARAT

13. Two STONE INSCRIPTIONS, PALITANA, DISTRICT BHAVNAGAR.—Of the two inscriptions, engraved in Nagari script and Sanskrit language on the pedestals of two Jaina images, one is fixed into the wall of" the Ashtapati-mandir while the other in the niche facing the west in Vidisvara-mandir at Satrunjaya hill. The first one, dated in Vikrama year 1383 (AD 1326), records that the image of Charuchandra-Suri was caused to be made by Buddhinivasa, a lay disciple of Kumarach andra. The second one, dated in Vikrama year 1414 (AD 1358), records that the image was caused to be made by *Sa-saliga* and *Sa-sajanasimha.* It was consecrated by Devagupta-suri, the disciple of Kakka-suri.

14. MAITRAKA INSCRIPTION, MODHAVADA, DISTRICT JUNAGADH.—Engraved on an undressed rectangular stone fixed in the right side wall of a step-well in the village, the record is in Siddhamatrika characters of about the eight century and in Sanskrit language, and refers to the rule of Maharaja Siladitya. It also records some pious act on the part of certain Isana. If the reading of the date is taken as Gupta-Valabhi Samvat 300+40+6 (i.e. 346), the king would be Siladitya III.

15. INSCRIPTION, VIRPUR, DISTRICT KHEDA.—It refers to the name of Yuvraja Dara Shikoh and Padshah Shah Uahan; the inscription is dated to AD 1657.

HARYANA

16. FRAGMENTARY INSCRIPTION, CHIDIYA, DISTRICT MAHENDERGARH.—Engraved on a broken slab, now preserved in the Haryana Prantiya Sangrahalaya, Jhajjar, it is in Sanskrit language and Kushana Brahmi characters of the first-second century AD. It refers to the reign of a Gotamiputra whose name is lost and who bears the title of *rajan.* It also mentions the *purodhas* (royal priest whose name is lost), who is described as the son of Sivasarman, as belonging to the Kausikya-sagotra and as a constant drinker of the sacrificial *soma* juice.

17. MEDIEVAL STONE INSCRIPTION, ROHTAK, DISTRICT ROHTAK.—A fragmentary stone inscription in two verses, in the Devanagari script, has been found engraved on a rectangular stone slab from the place.

KERALA

18. INSCRIPTION, EZHUTHUKAL, DISTRICT MALLAPURAM.—A single-line inscription was noticed on a natural rock by the side of the river Cherupuzha in the Nilambur reserved forest. The script seems to be old Malayalam and the area where the inscription was found is locally known as Ezhuthukal.

KARNATAKA

19. TAMIL INSCRIPTIONS, ALUR, DISTRICT BANGALORE.—These two inscriptions in Tamil characters of about the eleventh century AD are engraved on inner sides of the front wall of the Somesvara temple. One of them is dated in the thirty-second regnal year (AD 1043-44) of Chola king Rajendra I. It also refers to *Dandanayaka* Kadarangonda Sola Brahmaraya as also to Alur which is said to be situated in Sannai-nadu in Vikramasola-mandalam. The second one records the gift of land by Embikamundan who is also said to have constructed a sluice for the lake near the land donated.

20. KANNADA INSCRIPTION, GADAG, DISTRICT DHARWAR.—This inscription is in Kannada language and characters of the twelfth century and engraved on an ornate pilaster of the *ardha-mandapa* of the Sarasvati shrine in the Trikutesvara temple. It refers to Udega, who is extolled as *anekachitra sastradi upanyasaka, dushta ruvari mada-mar (dda) na, achcharipa-ruvari* (sculptor with an astounding skill), *Bhuvanaika-bhumbhuka* etc., and referred to probably as the disciple of Kriyasakti-panditadeva. He is seemed to have been responsible for the construction of the shrine of Sarasvati.

21. COPPER-PLATE CHARTERS, KOD, DISTRICT DHARWAR.—Out of the eighteen copper-plates, along with two standards of bronze Gandabherunda, four are blank though prepared for incising inscriptions, while the other fourteen represent two distinctive sets, perhaps referring to certain Saivite practices.

22. INSCRIPTIONS FROM SANTINATHA BASADI, JINANATHAPURA, DISTRICT HASSAN.—Among the two (pl. XXXV) inscriptions, one is engraved on the inner side of the northern wall of the the *mandapa* and mentions certain grants to the Santinatha *basadi.* It also records the grant of a bronze *torana* with fifteen bronze and four copper leaves, seven end-decorations (*karnapalika),* five lamps of ruby and a mirror by one Bomisetti of Arasikere. The other one, engraved on southern wall of the *garbha-griha,* records a grant to *Sagara-nandisiddhanta-devara basadi.*

23. COPPER-PLATES OF KADAMBAS, SHIVALLI, DISTRICT SHIMOGA.—Two sets of copper-plates (pl. XXXIV), belonging to the Kadamba king Krishnavarma and dated to about AD 530, were acquired from the village. The plates are written in the Kannada script and Sanskrit language. The first set records that the Kadamba king Krishnavarma, in the seventh year of rule, granted 6 *nivartanas* of land near *Santa-tataka* to a Brahmin Ravisvami. The second set records that the same king, in the twelfth year of his rule, made grant to Sankarasvami, near Bandanike.

MADHYA PRADESH

24. COPPER-PLATE CHARTERS, PIPALDA, DISTRICT INDORE.—Two rectangular copper-plates, found in the possession of Narayana Motiram Patel, a resident of the village, and now preserved in the Central Museum, Indore, contain twenty-seven lines in the Nagari script of the eleventh century AD. The charter is issued by the king Bhoja on *Chaitravadi* 5 of Samvat 1078 and records the grant of village Dharanyapur situated in the *bhoga* of Kampilya to a Brahmin Rawabhadra Dikshit, resident of Anandpur, on the occasion of *tula-dana.*

MAHARASHTRA

25. BRAHMI INSCRIPTION, KANHERI, DISTRICT BOMBAY.—Two commemorative stone inscriptions giving the names of the monks were found during exploration of the place. Palaeographically the epitaphs may be dated between AD 500 to 600.

26. BILINGUAL INSCRIPTIONS, TULJAPUR, DISTRICT OSMANABAD.—Dated in the Sam Sarvajit (AD 1643), the inscription engraved on a slab, kept in the Tulajabhavani temple and in Gujarati and Sanskrit languages and Nagari characters of the seventeenth century states that it is a gift of Bhavanidasa of Pathana-nagar in Gujarat.

TAMIL NADU

27. INSCRIPTION, KALATTUR, DISTRICT CHINGLEPUT.—This ten-line inscription, engraved on a slab in two pieces in the field, close to a dilapidated Saivite temple, is in Tamil language and characters of about the ninth-tenth century. It records a gift of three *kalanju* of gold (for performing certain services in the temple).

28. KONGU CHOLA INSCRIPTION, AVANASHI, DISTRICT COIMBATORE.—This Tamil inscription, dated in the fifteenth regnal year of Kulottunga, records the grant of certain privileges to the *pappara sanrar* in Vadaparisara-nadu by the king in recognition of their services in depositing the (royal) goods with him (the king) *(nam sarakkukku porul vittamaiyil),* such as the privilege of being carried in the palanquin, travelling on the horse back, holding Chinak-kodai (Chinese umbrella) being accompanied by persons blowing trumpets, (their woman-folk) wearing *tilaka* on the forehead, dividing and dressing their tresses of hair and band the tip of the plaited locks, their regiments being bedecked with ornaments, wrapping themselves with green upper garments, belting the children with golden girdles and going in procession in the village (on the horse back) after the payment of marriage tax.

29. KONGU CHOLA INSCRIPTION, SOMAVARAPPATTI, DISTRICT COIMBATORE.—Engraved on the *adhishthana* of the *garbha-griha* and *ardha-mandapa* of the Isvara temple and dated in the thirteenth regnal year of Atiseya-Chola Viranarayanadeva, this inscription is in Tamil language and characters of the eleventh-twelfth century. It records a gift of the proceeds from the lands for the daily worship and offerings to the deity Amarabuyamka(ra)-Isvaram-udaiyar at Amarabuyankarapuram, by the guild *nangu-disai-ayiratt-ainnu-rruyar* and *Andai-appar-uddayan,* a merchant of this *nagara.*

30. NAYAKA INSCRIPTIONS, DISTRICT NORTH ARCOT.—Fifteen inscriptions, one each at Ambur, Chinnasomeswaram, Kandaneri, Kilarasampattu, Mel-Manavur, Palampakkam,

Pillikonda, Perumugai, Sampanginellur, Solavaram, Tuttipattu, Tcllur, Vcppampattu, Vinnamangalam and Virinjipuram, were noticed in the District.

31. PANDYA INSCRIPTION, NEMAN, DISTRICT RAMANATHAPURAM.—Dated in the fifteenth regnal year (AD 1230-31) of Maravarman Sundara-Pandya I, this Tamil inscription found engraved on Madanandisvara temple records the assignment of tax (*kadamai)* from out of the lands of Jayangondanallur, to the deity Agattisvaram-udaiya-nayanar of Arkadu in Tenarruppokku in Keralasinga-valanadu by three persons of Arkadu to whom the lands were sold for price-value by Kandan Udaiyancheydan *alias* Kangayan.

32. PANDYA INSCRIPTIONS, TALAKKAVUR, DISTRICT RAMANATHAPURAM.—Among the two inscriptions in Tamil language and characters, the first one, found from the Kathcsvara temple and dated in the fifteenth regnal year (i.e. AD 1230-31) of Maravarman Sundara-pcndcya I, records that the *urom* of Talakattu-ur undertook to measure the produce from out of the lands brought under cultivation after exempting them from specified taxes for the deity Kanthadcva-Isuram-udaiya-nayanar. The second epigraph, dated in the fifth regnal year of Jatavarman Vikrama Pandya and palaeographically assignable to the thirteenth century, records the assignment of lands as *kudininga-devadana* on lease to a certain Tiruchirrambalam-udaiyan, a *vellala* Kalani-vayil a*lias* Srivallabhapuram by the *devakanmis, srikaryam-cheyyargal* and *sri-mahesvara-kankani-cheyvargal* of the temple of Srikanthadeva-Isuram-udaiya-nayanar and the *urom* of Talakattu in Tenarruppokku in Keralasinga-valanadu.

33. THREE PANDYA INSCRIPTIONS OF UNJANAI, DISTRICT RAMANATHAPURAM.—Of the three Tamil inscriptions located from Chokkanatha temple, the first one is dated in the thirteenth regnal year of Rajarajan Sundara-Pandya of the thirteenth century. It refers to the order (*tirumugam)* written in the name of the deity Malava-chakravatti-Isvaram-udaiya-nayanar, according to which the lands of Unjenai were given to Sendanka-udaiyar *alias* Arasamanavaludeva as *kudininga-kani.* The second inscription, assignable to the thirteenth-fourteenth century on palaeographical grounds and dated in the 2 + 6th regnal year of Vira Pandya, records the appertionment of *800 pon* from out of 2400 *pudup-pon* stipulated per annum, from the *nadu,* to the *nattar* of Unjenaipparru on the seventh day of the month of Panguni. The third dated in the tenth regnal year of Jatavarman Rajan Sundarapandya seems to record an undertaking *(pidipadu)* given at the instance of Gangaiyar by *Sri-Rudra-sri-mahesvara-kankani-cheyvargal* of the temple of Malavachchakravatti-Isvaram-udaiya-nayanar of Unjenai in Perumburnadu in Keralasingavalanadu, to Arasamanavaladevar of Melaivayil in Talaiyur-nadu, for the purpose of the food-offerings to the deity, from out of the income from taxes on lands and also the contribution of paddy from lands yielding seasonal crops. On palaeographical ground this inscription may be dated to thirteenth-fourteenth century AD.

34. KONGU CHOLA INSCRIPTION, PERIYA KAKKAVERI, DISTRICT SALEM.—Dated in the fourteenth regnal year and 361st day of Konerinmaikondan, this inscription of the thirteenth-fourteenth century, records the royal order *(tirumugam)* in respect of levying tax with effect from the fourteenth regnal year, at the rate of one *uri* per *kuli* on the cultivated lands from among the lands that were enjoyed tax-free up to the thirteenth regnal year by the *battas* (Brahmanas) of the Rasipurapparru in Sela-nadu.

35. KONGU PANDYA INSCRIPTION, SINGALANDAPURAM, DISTRICT SALEM.—This Tamil inscription dated in the twelfth regnal year of Rajakesarivarman *alias* Vira Pandya (AD 1277) records an agreement made by the *uravar* of the *nagaram* Singalantakapuram in Sela-nadu for the consecration of the deity Pillaiyar in the temple of Thiru Virattanam-udaiya-nayanar and the gift of *taragu* (tax) etc., for the food-offerings to the deity for the merit of the king (*Perumal).*

ARABIC AND PERSIAN INSCRIPTIONS

ANDHRA PRADESH

1. MISCELLANEOUS INSCRIPTIONS, TADPATRI, DISTRICT ANANTAPUR.—Out of two inscriptions one is transcribed in Naskh by Abul-Hasan ash-Shirazi (i.e. of Shiraz in Iran) and records the construction of a mosque on the site of a temple in AH 1107 (AD 1695-96) by Mahmud. The other registers the death of Maulana Muhammad Abdullah Shahid, son of Nizamud-Din Ahmad Kabir in AH 1145 (AD 1733); the appellation *Shahid* suffixed to the name of the deceased is suggestive of his having met his death as a martyr.

2. BILINGUAL INSCRIPTION, THUMMALA, DISTRICT ANANTAPUR.—A bilingual epigraph from the place states that the construction of a mosque was completed in AH 1085 (AD 1674-75) by Aqa Ahmad Kunjayi (?), a servant of the famous Qutb Shahi general Naknam Khan.

3. INSCRIPTIONS OF ASAF JAHI, GOLCONDA FORT, DISTRICT HYDERABAD.—There are about two dozen guns cast during the reign of Nawwab Mir Mizam Ali Khan (Asaf Jah II), inscribed with the name of their manufacturer Muhammad Qasim, also bearing the dates AH 1185 (AD 1771-72), AH 1193 (AD 1779) and AH 1198 (AD 1783).

4. INSCRIPTION MAHARAJA RANJIT SINGH, GOLCONDA FORT, DISTRICT HYDERABAD.—This inscription found engraved on a gun in the Golconda fort records the name of Maharaja Ranjit Singh and states that the gun, *Saf Shikan* ('Breaker of the Rank'), was used in Samvat 1896 (AD 1839) in some campaign.

GUJARAT

5. INSCRIPTION OF MINOR CHIEFS, BHAVNAGAR, DISTRICT BHAVNAGAR.—The inscription of the time of Maharaja Takht Singh (of Bhavnagar), records the construction of a mosque in AH 1308 (AD 1891) by a lady Ba-Man *alias* Hans Ba.

6. BILINGUAL EPITAPHS, BHAVNAGAR, DISTRICT BHAVNAGAR.—Two bilingual epitaphs record the death of two ladies viz., Kani Bai and Hans Bai in AH 1319 (AD 1901) and AH 1326 (AD 1908) respectively.

7. MISCELLANEOUS INSCRIPTIONS, GHOGHA, DISTRICT BHAVNAGAR.—Out of the three epigraphs, the one records the construction of a tomb over the remains of Sidha Ali in AH 1041 (AD 1631-32) during the time of Bahai Khan. According to another record, from the same place, which is damaged and undated, the minister (Diwan) Bahai' Khan, son of Haji Abdullah at the request of the saintly Sidha Ali constructed the mausoleum. Another epigraph from the same place records the construction of a tomb ever the remains of Abdur-Rehman in AH 1107 (AD 1696) by the Faqir Mubtala.

A good number of epitaphs, which are unfortunately damaged, was found here. Some of the deceased mentioned are: Shamsud-Din, son of Muhammad Khass (d. AH 1919 AD

1information from N. M. Ganam, Superintending Epigraphist of the Survey. He was assisted by M. F. Khan, S. S. Husain, M. Y. Quddusi and Shri Ilyas Quddusi who found, copied, examined and reported on two hundred and six inscriptions during the year. Nos. 8 and 9, were received from R. N. Mehta, of the Department of Ancient History and Archaeology, M. S. University of Baroda and R. S. Bisht of the North-western Circle of the Survey respectively.

1513); Khoja (name lost), son of Haji Muhammad Darab (3) of *circa* sixteenth century Haji Rajab son of Haji Muqbil (d. AH 928 AD 1522), Munawar Baba Faqir (d. AH 1021 AD 1612), Abdullah (d. AH 1022 AD 1613), Tandel Isaji (d. AH 1120 AD 1708), Shah Mubtala (d. AH 1123 AD 1711), Umar, son of Ahmad (d. AH 1201 AD 1786) and Tandel Hasan, son of Binai Bapuj (d. AH 1204 AD 1790).

8. INSCRIPTION OF VAGHELAS OF GUJARAT, SAMPA, DISTRICT VADODARA.—This bilingual record of AH 704 (AD 1304), now kept in the Department of Ancient History and Archaeology, M. S. University of Baroda states that through the charitable acts of the king Ray Karn Dev and (nobles Malikul-Akabir ('Prince of the great ones'), Balchak and Malikul-Umara ('Prince of the nobles'), Shadi, one Tajud-Din Hasan, son of *Vazirul-Vuzara* ('minister of ministers'), Najmud-Dunya-wad-Din Mahmud Khatib endowed the village Sampa, situated in the Kanam territory, along with all its boundaries and with whatever is connected with it for the maintenance of the Jami-mosque of Kambaya (Cambay or Khambhat).

JAMMU AND KASHMIR

9. PERSIAN INSCRIPTION, BABNERGARH AND DERGARH, DISTRICT JAMMU.—Two Persian inscriptions, one each on the gateways of Babnergarh and Dergarh forts, were noticed.

MAHARASHTRA

10. ADIL SHAHI INSCRIPTION, ALABAD, DISTRICT KOLHAPUR.—Dated AH 1003 (?) (AD 1594-95), it records the construction of a mosque named Masjid-e-Husaini at Alyabad, situated in the village of Kapshi in Hikori (Hukkeri) Pargana by Saifud-Din Kamal of the family of Sayyid Muhammad Husaini in the reign of Ibrahim Adil Shah, when the ministership was held by Ikhlass Khan.

An epitaph from the place states that Ahmadan, son of Ali Bakhshi (?) Asad Khani died in AH 972 (AD 1564-65); it was inscribed by a poet with the *nom-de-plume* Soz.

11. INSCRIPTION OF ADIL SHAH, BHADOLE, DISTRICT KOLHAPUR.—A metrical epigraph of (Ibrahim) Adil Shah (I) records the construction of a mosque in AH 959 (AD 1551-52) by Bijli Khan. It was composed by Zauqi. Another record refers to the completion of the construction of a building (evidently the mosque on which it is found) in AH 961 (AD 1552).

12. MISCELLANEOUS INSCRIPTION, MARWAD, DISTRICT JALGAON.—This is a record in Urdu and states that the work of construction of the village gateway was completed in AH 1294 (AD 1877) by the inhabitants of the village under the supervision of Gopa Patel.

13. EPITAPH, JAYATAPUR, DISTRICT RATNAGIRI.—It records the demise of Bibi Amina, daughter of late Dinar Khan, in AH 1293 (AD 1876).

UTTAR PRADESH

14. EPITAPH, AGRA, DISTRICT AGRA.—This epitaph refers to the death of Mir Qutbi, son of Shah Mir, in AH 966 (AD 1558-59).

15. MOSQUE INSCRIPTION, BISAULI, DISTRICT AGRA.—Out of two, the first one records the construction of mosque in AH 1169 (AD 1755-56), while the second construction of yet another mosque is in AH 1181 (AD 1667-68) by Ibrahim Khan.

16. MUGHAL INSCRIPTION, BASI KOTLA, DISTRICT BIJNOR.—Belonging to the reign of Ahmad Shah, it records the construction of a mosque during his third regnal year corresponding to AH 1163 or Fasli year 1158 (AD 1750).

17. MUGHAL INSCRIPTION, DARANAGAR, DISTRICT BIJNOR.—The record refers to the construction of a well in AH 1110 (AD 1698-99). The name of the builder is, however, lost.

18. INSCRIPTION OF JAHANGIR'S TIME, BIJNOR, DISTRICT BIJNOR.—Belonging to the time of Jahangir, this metrical inscription records the construction of a well in AH 1024 (AD 1615) by Muhammad Muhsin.

19. EPITAPH OF AURANGZEB'S TIME, GHAUSPUR, DISTRICT BIJNOR.—This epitaph of the time of Aurangzeb refers to the death of Arif Ali Shah, described as a saintly and learned person, in AH 1072 (AD 1661-62).

20. AURANGZEB'S INSCRIPTION, KIRATPUR, DISTRICT BIJNOR.—Belonging to Aurangzeb, this inscription refers to the construction of the Government office building *(kachehri)* by Raychand Simh, the *Zamindar* of the town (*Qasba)* of Kiratpur in the regnal year 51 (AD 1706-07).

21. MISCELLANEOUS INSCRIPTION, NAJIBABAD, DISTRICT BIJNOR.—This inscription records that the tomb of Najibud-Daula, founder of the town of Najibabad. who died in AH 1184 (AD 1770), was damaged during the Maratha raids in the year AH 1185 (AD 1771). It. was reconstructed in AD 1887 by the Government of North-Western Province, the orders having been given by Sir Alferd Layal (Alfred Lyall) on the occasion of his visit to Najibabad.

22. MUGHAL INSCRIPTION, ISLAMNAGAR, DISTRICT BUDAUN.-An inscription referring to the reign of Aurangzeb assigns the construction of a mosque and a tomb over the remains of his son Shamsud-Din Muhammad Masum to Sadrud-Din Muhammad. It ends with an imprecation that any Muslim of the locality who would bury the dead m the eastern courtyard of the tomb would incur the curse of God and His Messenger (i.e. the Prophet Muhammad).

HI. NUMISMATICS AND TREASURE TROVE[1]

ANDHRA PRADESH

1. COPPER-COINS, DISTRICT ANANTAPUR.—Out of two copper coins of the sixteenth century, acquired from V. Subbachari of Nethalapalli, one bears the figure of an elephant on the obverse and an Arabic inscription on the reverse, while the other having Arabic legends on both the sides.

2. BRASS NANDI, DISTRICT ANANTAPUR.—One seated *nandi* of the Vijayanagara period was acquired from R. Suryanarayana Reddy.

3. IMAGE OF VIRABHADRA, KADAVAKALLU, DISTRICT ANANTAPUR.—One stone image of Virabhadra, assignable to the Vijayanagara times, was collected from Anandanan Narasimhaiah. It is in the *samabhanga* and holds the arrow and bow in his two hands. The image is- now displayed in the office of the Registering Officer, Anantapur.

4. SCULPTURE, SASANAKOTA, DISTRICT ANANTAPUR.—One image of Vighesvara of the Vijayanagara times was acquired from Chinna Narasimha Reddy for display in the Museum.

5. COINS, DISTRICT ANANTAPUR.—Two hundred sixty-four coins, of which two in pieces, were received from the Collector, Guntur as a treasure trove. These coins belong to the Ikshvaku rulers of Vijayapuri (Nagarjunakonda).

6. COPPER COINS, DISTRICT RANGA REDDY.—Two hundred seventy-five issues of Vishnukundins were acquired from Keesara in Medchal Taluk of the District.

GOA, DAMAN AND DIU

7. SCULPTURES, DISTRICT GOA.—The Archaeological unit of the Department acquired: image of Kuvalesvara from Korgaon of Parnem Taluk; bronzes of unidentified image from Mardol; and Kapilesvara from Ponela Taluk; Gomukha, a sword and one broken image of Vishnu from Narva in Dicholi Taluk and a broken image of Ganesa from Salavli Irrigation Dam site.

GUJARAT

8. SILVER ISSUES, DISTRICT BANAS KANTHA.—One hundred thirteen coins of the Sultanate period were acquired from Basu in Vadgam Taluk under the Indian Treasure Trove Act 1878.

1information from: 1 to 6 the Department of Archaeology, Government of Andhra Pradesh; 7 the Directorate of Archives, Archaeology and Museums, Panaji: 8 to 14 the Department of Archaeology, Government of Gujarat; 15 and 23 the North-western Circle of the Survey; 16 to 20 the Department of Archaeology and Museums, Government of Karnataka; 21-22 Shobhana Gokhale of Deccan College Post-graduate and Research Institute, Pune; 24 the Department of Tourism, Cultural Affairs and Archaeology, Government of Punjab; 25 to 27 the Department of Archaeology and Museums, Government of Rajasthan; and 28 the Department of Cultural Affairs, Antiquities and Art Treasures, Government of Uttar Pradesh.

9. STONE SCULPTURES, DISTRICT JUNAGADH.—One sculpture each of Brahma, Vishnu and Siva, all made of limestone, were found from Prabhas Patan as treasure trove. On stylistic ground these may be dated to the twelfth century AD.

10. SCULPTURES FROM SHADESAR, DISTRICT JUNAGADH.—Two stone images of Tirthankara, one of them being of Rishabhadeva, were acquired from the place under the Treasure Trove Act. The images may be assigned to the thirteenth-fourteenth century AD.

11. CANNON WITH IRON BALLS, DISTRICT KHEDA.—Fourteen cannon made of *pancha-dhatu* and one thousand ninety-nine iron balls, assignable to eighteenth-nineteenth century, were acquired from Petlad village under the Indian Treasure Trove Act 1878.

12. SCULPTURES, DISTRICT RAJKOT.—Two limestone images of Surya and his consort datable to the thirteenth century, were acquired from Samadhiyava of Upleta Taluk, as treasure trove find.

13. CANNON, DISTRICT SABAR KANTHA.—One copper cannon along with an iron stand, datable to the eighteenth-nineteenth century, was collected from Ambliyara of Bayad Taluk.

14. SCULPTURES, PRANTIJ, DISTRICT SABAR KANTHA.—Five marble images of Tirthankaras, of which one is of Rishabhadeva, all datable to the fifteenth-sixteenth century AD were acquired.

KARNATAKA

15. VIJAYANAGARA FANAMS, TIMMANAHALLI, DISTRICT BANGALORE.-----One gold issue of Harihara II (AD 1377-1404) of the Vijayanagara dynasty, thirty-nine gold Virarayi *fanams,* one bent gold ring, and a hook were obtained as treasure trove.

16. GOLD COINS AND ORNAMENTS, DISTRICT BELLARY.—Twenty-nine coins of Alauddin Bahman Shah AH 748-759 (AD 1347-1358) and Devaraya I (AD 1406-1412) of the Vijayanagara dynasty and five ornamental pieces, two each of ear-studs and bead-shaped hollow ornaments and a ring, all made of gold, were acquired from Devalapur as treasure trove. The coins of Alauddin Bahman Shah bear the legend as *Sultan ul Aa(Zam), Alaudduniya Waddin Abul Muzqffar Bahman Shah* on the obverse and *Sikandaru Ssani Aminul Khilafat Kasire Amirul Momineen* on the reverse while the gold issues of Devaraya bears the legend *Sri Pratapa Deva Raya* on the obverse and the figure of Lakshminarayana seated on a lotus on the reverse.

17. GOLD FANAMS, DISTRICT HASSAN.—Nine gold *fanams* of the Hoysala king Ballala were collected from Lakshminarayanasvami temple, Holenarasipur, as treasure trove.

18. GOLD COINS AND JEWELS, DISTRICT KOLAR.—A hoard consisting of thirty-two coins and jewels, of which one small *fanam* of Hyder Ali, one half sovereign and seventeen coins issued from Sydney Mint (AD 1843-60), one of George IV. (AD 1820-30) and fourteen sovereigns of queen Victoria (AD 1838-58), all of gold, was acquired from Mulbagal, as a treasure trove find.

19. COINS, KONANDUR, DISTRICT SHIMOGA.—Two gold and three silver issues were collected as treasure trove. Of the two gold coins, one is of Hyder Ali and bears the depiction of Siva and Parvati on the obverse and the initial of the ruler on the obverse. The other one was issued by the Hoysala king Ballala.

MAHARASHTRA

20. SATAVAHANA COINS, DISTRICT AURANOABAD.—In the course of exploration Shobhana Gokhale discovered silver coins of Vashisthaputra Satakarni, Vashisthaputra Pulumavi and Gautamiputra Satakarani at Aurangabad.

21. KURA AND YADAVA COINS, KOLHAPUR, DISTRICT KOLHAPUR.—Of the two coins discovered by Shobhana Gokhale, the copper one is of Sivala of Kura dynasty and bears the legend *Sivalasa* in Brahmi and a figure of lion facing left on the obverse and *chaitya* and tree-within-railing on the reverse. The silver coin is of the Yadava king Mahadcva and bears the depiction of a lion facing left on the obverse and Devanagari legend *Sri Mahade* on the reverse.

22. MISCELLANEOUS COINS, DISTRICT PATIALA.—One thousand five hundred coins of Maharaja Ranjit Singh, two thousand seven hundred forty-six of the Delhi Sultanate and four hundred ninety-six gold coins and *mohars* of the Lahore Darbar were acquired from Patiala Treasury under the Indian Treasure Trove Act 1878.

RAJASTHAN

23. MISCELLANEOUS COINS, DISTRICT BHARATPUR.—The Government Museum, Bharatpur acquired ninety copper and five silver coins from Jiwad and two hundred seventy-one silver coins from Newera as treasure trove finds.

24. SILVER COINS FROM GANEDI, DISTRICT SIKAR.—A hoard consisting of one hundred twenty-six base silver coins, assignable to the tenth-eleventh century, was acquired under the Indian Treasure Trove Act.

25. GADHIYA COINS, DISTRICT SIROHI.—Five hundred seventy-five Gadhiya silver coins were acquired by the Government Museum, Jodhpur from Bat as treasure trove.

IV. OTHER IMPORTANT DISCOVERIES

ANDHRA PRADESH

1. STONE SCULPTURES, CHENNUR TALUK, DISTRICT ADILABAD.—K. Krishnamurthy, D. Hanumantha Rao and G. V. Srcenivasa Rao of the South-eastern Circle of the Survey discovered clcvan sculptures, in red sandstone, one each of Venugopala, Balarama, Narasimha, Buddha, Parasurama, Kurma, Bhairava, Hanuman, Kaliyamardana, Parvati and Mahishasuramardini lying scattered on the right bank of the river Pranahita, near Vemananapalli village. On stylistic grounds these arc dated to the sixteenth century AD.

2. SIVA TEMPLE AND STONE TOOLS, SODALPUR, DISTRICT ADILABAD.—A Siva temple datable to the tenth century AD was found. A few microliths were also collected from the slopes of a hill.

3. CAVES AND ANCIENT SITE, CHENNEKOTIIAPALLI TALUK, DISTRICT ANANTAPUR.—The Registering Officer discovered caves on the top of Ramulakonda hill in village Masanakota. This hill has a fortification wall and a few caves, the latter without paintings and sculptures. A few polished stone adzes were recovered from a cave called Ramulagudi. Between the two hills of Ramulakonda and Durgamkonda an ancient site was discovered yielding red and black wares.

4. MEGALITH AND MENHIR, MUDIGAL, DISTRICT ANANTAPUR.—The Registering Officer discovered a swastika-type cist burial and a menhir on the nearby hill.

5. ANCIENT SITE, LEBAKA, DISTRICT CUDDAPAH.—The Registering Officer discovered ring-wells, apart from pottery comprising red and grey wares, at Lebaka village.

6. MEDIEVAL TEMPLES, AMRAKONDA, DISTRICT KARIMNAGAR.—P. Arundhati, Registering Officer noticed two small temples with sculptures of Devi and Vinayaka datable to the eleventh century AD.

GUJARAT

7. YOJANASTHAMBHAS, DISTRICT AHMADABAD.—K. N. Momin of M. S. University, Vadodara, noticed *yojanasthambhas* at Bardoli, Mirjhapur and Rakhiyal.

8. INDO-ISLAMIC MONUMENTS, DISTRICT BHARUCH.—Sultan Ahmed of M. S. University, Vadodara, noticed sixty-five Indo-Islamic monuments at Bharuch town. Of these, Cunarwada mosque (AH 799 AD 1396), tombs of Bibi Ayesha (AH 971 AD 1563), Khwaja Sharaf (AH 978 AD 1570-71), and Maulana Idrus *(c.* AD 1750) deserve mention on account of their architectural and decorative features.

9. JAINA SCULPTURES, TALAJA, DISTRICT BHAVNAGAR.—B. L. Nagarch of the Western Circle of the Survey, discovered the pedestal of a Jaina Tirthankara with two lions, two seated *yakshas,* an image of a seated Jaina goddess and the figure of a bearded king assignable to *circa* eleventh century AD.

10. MEDIEVAL TEMPLE, MAL-ITADI, DISTRICT KHEDA.—K. N. Momin of M. S. University, Vadodara, discovered a well-preserved Siva temple *(c.* eleventh century AD) at Mal-Itadi.

11. YOJANA-STHAMBHAS, DISTRICT KHEDA.—K. N. Momin of M. S. University, Vadodara, noticed several brick-built *yojana-sthambhas* at Bhagwanjina, Khcrnamuwada, Jinjhar, Muwada, Nizarpur, Ramosadi and Rudan. They arc situated at a regular distance of 14 km from each other.

12. MEGALITHS, DISTRICT KUTCH.—Megaliths, probably belonging to the early historical period, were noticed at Kaniyabe Kuvathada, Trambo (pl. XXXVII A), Ler, and Hajper in Bhuj Taluk, Ner and Bandhadi in Bhachan Taluk, and Manzal in Nakhtrana Taluk.

13. MEDIEVAL SCULPTURES, SIDHPUR, DISTRICT MEHSANA.—B. L. Nagarch, P. K. Trivedi and H. Michael of the Western Circle of the Survey noticed sculptures of seated Uma-Mahesvara, a royal worshipping couple, a head of Siva (pl. XXXVI A) and a fragment of *Salabhanjika* recovered from the Jami Mosque. All these arc assignable to *circa* twelfth century AD.

14. STEP-WELL, BHOJELA, DISTRICT PANCH MAHALS.—R. D. Singh and P. K. Trivedi of the Western Circle of the Survey discovered a step-well containing image of Mahishasuramardini, Seshashayi Vishnu, Lakshmi-Narayana and Navagrahas datable to *circa* fifteenth century AD. An image of Parvati was also noticed near by. Besides, various architectural components and stone images of Mahishasuramardini, Brahmani, Lakshmi and Siva, assignable to the same period as above, were also noticed.

15. MEDIEVAL SCULPTURE, SAGTALA, DISTRICT PANCH MAHALS.—V. H. Sonawane of M. S. University, Vadodara, discovered an image of Krishna datable to the fifteenth-sixteenth century AD.

16. MEDIEVAL SCULPTURES, MEMORIAL STONES, SANTRAMPUR, DISTRICT PANCH MAHALS.—R. D. Singh and P. K. Trivedi of the Western Circle of the Survey discovered the stone images of Vishnu, Mahesvari, Bhairava and a Jaina along with various architectural components assignable to *circa* fifteenth-sixteenth century AD. A number of inscribed memorial pillars dating from *circa* twelfth to eighteenth century AD were also noticed.

17. TEMPLES, ZALOD, DISTRICT PANCH MAHALS.—B. L. Nagarch and H. Michael of the Western Circle of the Survey discovered a group of eleven temples varying in dates from *circa* twelfth to the eighteenth century AD. The noteworthy sculptures in these temples are those of Surya, Varaha, Vishnu, Revanta, Balarama, Narasimha and Buddha.

18. MEDIEVAL INSCRIPTION, SAMPLA, DISTRICT VADODARA.—R. N. Mehta, of the M. S. University, Vadodara, noticed a bilingual inscription dated 18 August 1304 (15 Mohram 704 Hijri or 1360 Vikram Samvat, Tuesday, Bhadrapad second day), referring to the donation of Sampla village to the Jami mosque at Cambay by Maharajadiraja Karna and other.

19. BRASS IMAGE, VADODARA, DISTRICT VADODARA.—P. K. Trivedi of the Western Circle of the Survey noticed a metal image of Vishnu bearing an inscription dated Samvat 1473 (AD 1416) on its back (pl. XXXVI B and C).

HARYANA

20. TEMPLE RUINS, ROHTAK, DISTRICT ROHTAK.—D. R. Gehlot and R. N. Kaw of the North-western Circle of the Survey noticed ruins of a temple including sculptures, carved pillars and architectural members, in a mosque assignable to the ninth-tenth century AD (Gurjara Pratihara).

HIMACHAL PRADESH

21. SCULPTURES AND CANNON, KAMALAH FORT, DISTRICT MANDI.—S. N. Kesarwani and R. K. Sapru of of the North-western Circle of the Survey noticed a bronze image of Ganesa and several cannon of *circa* sixteenth-seventeenth century AD in the Kamalah fort.

22. TEMPLE AND SCULPTURES, MAMEL, DISTRICT MANDI.— S. N. Kesarwani of the North-western Circle of the Survey noticed a wooden temple of Gaurisankara assignable to *circa* sixteenth-seventheenth century AD at Mamel in Tehsil Sarkaghat. Besides, more than two dozen stone sculptures and architectural members were found either fixed in the compound wall or placed in the *pradakshina-patha* of the temple. These are datable from *circa* ninth to seventeenth century AD. Notable images are those of Vishnu, Surya, Siva-Parvati, Mahishamardini and Ganesa.

JAMMU AND KASHMIR

23. SUR FORTS, TEHSIL SAMBA, DISTRICT JAMMU.—The Curator, Dogra Art Gallery, Jammu, discovered four Sur forts at Babnergarh, Dergarh, Malkot (or Mangkot) and Mohargarh, the last one identifiable with the Mankot fort of the time of Akbar. The extant features of the forts are four impressive gateways, two of which bearing inscriptions in Persian, fort walls, reservoirs and other ruins.

24. MEDIEVAL TEMPLE, DISTRICT POONCH.—The Curator, Dogra Art Gallery, Jammu, discovered a small Siva temple and three interlinked *kundas,* named after Rama, Sita and Lakshaman, in front of the temple.

25. MEDIEVAL SCULPTURES, JUNGPURA, DISTRICT PULWAMA.—S. N. Jaiswal and S. N. Kesarwani of the North-western Circle of the Survey noticed stone sculptures of Mahishamardini and Vaikuntha-Narayana at Tengpura belonging to *circa* tenth-eleventh century AD. The sculptures are now placed in the modern temple of Mata.

26. TEMPLE, LADDAN KOTLI, TEHSIL AND DISTRICT UDHAMPUR.—R. S. Bisht and B. K. Sinha of the North-western Circle of the Survey noticed a temple dedicated to goddess Jalandhara-devi of village Laddan Kotli. The temple and the *mukha-mandapa* are sculptured extensively, the sculptures depicting the scenes from the life of Rama and Krishna-War in addition to other mythology and local traditions.

KARNATAKA

27. ASH-MOUNDS AND HERO STONES, DISTRICT TUMKUR.—I. K. Sarma of the Temple Survey Project (South) noticed remains of ash-mounds at Gangdananahalh which yielded Black-and-red Ware and Red-slipped ware from the exposed cuttings. The lower levels contained ash, Neolithic grey ware as well as a ground stone axe, pounders and bones etc., besides an early image of

Chandra and a partially-dressed granite boulder containing a single-line inscription, with rows of short incisions presumably made by stone masons. Herur, a site close to the village Buddinne has scouraceous ash deposits. Black-and-red and grey wares and ground stone pounders were collected from the cut-sections. This ash mound site Jalagaradibba at Honudike is associated with ancient gold workings. At the eastern extreme of the mound stands a ruined brick temple; an inscribed slab here, of the time of Sripurusha (AD 726-799), refers to ten gifts of gold to goddess Ponniduki. The material collected from the mound includes Neolithic dull grey, burnished grey, and Black-and-red wares, ground stone-axes and pounders.

A cluster of twelve hero-stones *(viragab)* were also noticed by him in the above area.

MADHYA PRADESH

28. STONE SCULPTURE, MANDU, DISTRICT DHAR.—D. S. Sood of the Central Circle of the Survey discovered an image of Varaha of the Paramara period in a well near Kapur-talao.

29. BUDDHIST SCULPTURES, BILHARI, DISTRICT JABALPUR.—Four Buddhist sculptures of Buddha, Tara and Avalokitesvara belonging to the Kalachuri period were recovered in digging. These were taken over by S. N. Sharma of the Central Circle of the Survey.

30. ROCK-CUT CAVES, DHAMNAR, DISTRICT MANDSAUR.—V. N. Gupta of the Central Circle of the Survey discovered eight Buddhist caves assignable to *circa* eighth-ninth century AD.

MAHARASHTRA

31. ROCK-CUT CAVES, CHINTANE, DISTRICT DHULE.—L. S. Rao of the South-western Circle of the Survey noticed two rock-cut caves, one of which was unfinished. A few loose sculptures of Ganesa, Vishnu, Mahishamardini and a female deity were also found.

32. HEMADPANTI TEMPLE, JOGSHELU, DISTRICT DHULE.—L. S. Rao of the South-western Circle of the Survey noticed a ruined Hemadpanti temple known as Jageshvari-deul having an *adhisthana, garbha-griha, anlarala, sabha-mandapa* and *mukha-mandapa.*

33. STEP-WELL VIKHRANA, DISTRICT DHULE.—L. S. Rao of the South-western Circle of the Survey noticed a stellate step-well with a *mandapa* and a sculpture of Vishnu belonging to the Yadava period.

34. ROCK-CUT CAVES, MALSHET GHAT, DISTRICT PUNE.—R. C. Agarwal of the South-western Circle of the Survey noticed rock-cut caves and cistern in the rock of the Malshet ghat.

35. BUDDHIST CAVES, LONAD, DISTRICT THANA.—A. P. Jamkhedkar of the Department of Archaeology and Museums, Government of Maharashtra and M. N. Deshpande of the Nehru Centre, Bombay, exposed buried pillars, moulded plinth, doorsteps and the *yaksha* figures flanking the entrance to the hall (pl. XXXVII B). M. N. Deshpande identified scenes from the *Vessantara Jataka* and some others of Buddhist affiliation, all belonging to the fifth century AD. Its use for the workship of Khandesvari (Mahishasuramardini) came into vogue in the late medieval times.

MIZORAM

36. MANGKHAIA-LUNG, CIIAMPHAI VALLEY, DISTRICT MIZORAM.—The State Museum, Mizoram, discovered the Mangkhaia-lung, that is the tomb-stone of Mangkhaia, which is situated at the southern extremity of the Champhai valley, near village Zote. The tomb-stone measures 240 x 180 x 45 cm. It is carved with a series of standing human figures with interlocked hands. They represent the spirits providing security to the great chief.

37. LUNG MILLEM, TAWIKHAWTHLIR HILL, DISTRICT MIZORAM.—The State Museum, Mizoram, discovered three human figures, two standing and one sitting, engraved in bold relief on the southern edge of the Tawikhawthlir hill near village Mualcheng. The sitting figure is reminiscent of the Brahmanical or Buddhist meditational pose. These figures can be attributed to a period before the wholesale conversion of the local population to Christianity.

ORISSA

38. CANNON, PARADEEP, DISTRICT CUTTACK.—L. M. Wahal of the Eastern Circle of the Survey noticed a late medieval cannon in the neighbourhood of Samanta's house at Paradeep.

39. STONE SCULPTURE, PARADEEP, DISTRICT CUTTACK.—A. K. Bandopadhyaya of the Eastern Circle of the Survey noticed an image of Lokesvara fixed in a niche of a temple built within the compound of the Parasara Ashrama at Paradeep. The four-armed standing image (74 x 36 cm) holds rosary, water-pot, stems of a lotus in three hands while the fourth is in *varada.* He is flanked by Hayagriva and Sudhanakumar on the right and left respectively. The sculpture is datable to *circa* tenth century AD.

PUNJAB

40. PRE-HARAPPAN AND NEOLITHIC, DOMELI, DISTRICT JULLUNDER.—G. B. Sharma of the the Department of Tourism, Cultural Affairs, Archaeology and Museums, Government of Punjab, discovered a mound at Domeli, 2 km west of Phagwara-Hoshiarpur road, yielding Pre-Harappan and Harappan pottery, besides Neolithic tools.

RAJASTHAN

41. SIVA TEMPLE, CHITALI, DISTRICT DUNGARPUR.—B. L. Nagarch of the Western Circle of the Survey discovered a Siva Temple at Chitali assignable to *circa* eleventh century AD.

42. SIVA TEMPLE, BARGU, DISTRICT KOTA.—B. L. Nagarch of the Western Circle of the Survey discovered a Pratihara temple dedicated to Siva assignable to *circa* tenth century AD. It is embellished with beautiful images of Parvati, Chamunda, Surya, Harihara, Ganesa and Dikpalas.

43. GUPTA SHRINE, DIDWANA, DISTRICT NAGAUR.—B. L. Nagarch and R. Pathak of the Western Circle or the Survey discovered a Gupta shrine datable to *circa* fifth century AD built in ashlar masonry with barrel shaped roof decorated with *chaitya*-arch motif. Nagarch also discovered a Pratihara temple at Balia near Didwana assignable to *circa* eighth century AD having sculptures of Ganesa, Nataraja, Mahishasuramardini, Siva, Kartikeya and Dikpalas.

44. AKBARI MOSQUE, KETHOTI, DISTRICT NAGAUR—B. L. Nagarch and R. Pathak of the Western Circle of the Survey discovered a mosque built in AH 913 (AD 507).

45. MEDIEVAL SITE, KORTA, DISTRICT PALI.—R. Pathak of the Western Circle of the Survey picked up sherds of glazed and red wares at Korta.

46. WALL PAINTINGS, SOLODRIA, DISTRICT PALI.—R. Pathak of the Western Circle of the Survey discovered wall-paintings assignable to *circa* nineteenth century AD in a Siva temple at Salodria.

TAMIL NADU

47. TEMPLES, SCULPTURES AND TOMBS, DISTRICT CHINGLEPUT.—Sivananda Vcnkatarao of the Southern Circle of the Survey discovered a Chola temple at Pallalur village, and a dilapidated early Chola temple with inscriptions of Raja Raja Chola in village Parandur. Me further discovered a temple of the late Pallava period together with loose sculptures at Vallalam village. He also noticed loose sculptures of Vijayanagara period at Anyambakkam, Sitapuram, Tandalam and Tiruvanakaranai villages.

At Pallalur village he noticed two tombs dated 27 August, AD 1781.

UTTAR PRADESH

48. MEDIEVAL AND LATE MEDIEVAL REMAINS, AGRA, DISTRICT AGRA.—S. K. Goswamy and Narayan Vyas of the Northern Circle of the Survey noticed a number of Brahmanical sculptures belonging to the medieval period in the vicinity of Baluganj in Agra city. S. K. Goswamy, Narayan Vyas, C. P. Singh and Y. K. Sharma of the Northern Circle of the Survey also noticed a few *lakhauri-brick* structures exposed during the construction of an underground drainage-system near Belanganj in Agra city. A sculpture of a horse-rider in the Maratha style was also found.

49. JAINA IMAGE, FATEHPUR SIKRI, DISTRICT AGRA.—N. K. Bhardwaj of the Northern Circle of the Survey collected a fragment of a Jaina Tirthankara image, ascribable to the medieval times, from the village.

50. JAINA IMAGE, JAGNE, DISTRICT AGRA.—N. K. Bhardwaj of the Northern Circle of the Survey collected from Jagne a fragmentary image of a seated Jaina Tirthankara belonging to the medieval period.

51. KUSHANA-GUPTA POTTERY, NANDAN, DISTRICT AGRA.—C. B. Mishra of the Northern Circle of the Survey collected Kushana and Gupta pottery and a fragmentary Kushana terracotta figurine from the village.

52. MEDIEVAL SCULPTURES, PATHSAL, DISTRICT AGRA.—S. K. Goswamy and Narayan Vyas of Northern Circle of the Survey noticed here a number of Brahmanical sculptures of the medieval period.

53. MEDIEVAL SCULPTURES, RASULPUR, DISTRICT AGRA.—S. K. Goswamy and Narayan Vyas of Northern Circle of the Survey noticed a number of Brahmanical sculptures of the medieval period near Rasulpur village.

54. EARLY MEDIEVAL SITE, ABUPUR, DISTRICT GAZIABAD.—J. S. Nigam accompanied by A. K. Sinha, S. J. Hasan and Hari Chand of the Directorate of the Survey while on an inspection located an extensive mound south of the village Abupur (Jakhewa). The pottery, both plain

and painted, was on the whole fine; stamped designs also occurred. The shapes included knife-edged bowls, basins, *handis,* vases and lids. The remains of a structure made of mud-bricks (23 x 20 x 6 cm) were noticed in the exposed sections. It is a single-culture site and may be dated to *circa* tenth eleventh century AD.

55. CHANDELLA SCUIPTURES, BHAGWANTPUR, DISTRICT JHANSI.—L. M. Wahal of the Northern Circle of the Survey noticed Chandclla stone sculptures representing Ganesa, Kartikcya, Hara-Gauri and Dikpalas in the village Bhagwantpur.

56. MEDIEVAL SCULPTURES, AMRODHA, DISTRICT KANPUR.—L. M. Wahal of the Northern Circle of the Survey discovered stone sculptures of the Brahmanical pantheon representing Uma-Mahcsvara, Ganesa, Mahishasuramardini and Ekamukhasivalinga assignable to the medieval period.

57. KUSHANA TORANA-CAPITAL, CHANDNEPUR, DISTRICT KANPUR.—L. M. Wahal of theNorthern Circle of the Survey discovered capital of a *torana* depicting mythical animal figures seated back to back on both the faces of a capital slab. The upper part of the capital bears geometrical, rosary, beaded and leaf patterns arranged in successive horizontal bands.

58. MEDIEVAL SCULPTURES, KUMBHI, DISTRICT KANPUR.—L. M. Wahal of the Northern Circle of the Survey discovered medieval sculptures of Ganesa, Devi and Marichi.

59. MEDIEVAL SCULPTURES, NARWAL, DISTRICT KANPUR.—L. M. Wahal of the Northern Circle of the Survey noticed medieval sculptures of Vishnu, Varaha, Siva and Parvati besides fragmentary architectural members assignable to the medieval period.

60. MEDIEVAL SCULPTURES, RAHINIYAPUR, DISTRICT KANPUR.—L. M. Wahal of the Northern Circle of the Survey noticed medieval stone sculptures representing a fragmentary image of Vishnu, Ganesa and Mahishasuramardini.

61. EXPLORATION AT RAMAIPUR, DISTRICT KANPUR.—L. M. Wahal of the Northern Circle of the Survey reported the discover)' of medieval pottery from a mound situated in the village Ramaipur.

62. MEDIEVAL SCULPTURE, KUMEHRI, DISTRICT MAINPURI.—L. M. Wahal of the Northern Circle of the Survey noticed stone sculptures representing Ganesa, Siva, Parvati and a standing image of Siva.

63. A PALM-LEAF PAINTING OF GAURANGA MAHAPRABHU, DISTRICT MATHURA.—In course of registration of antiquities K. Kumar, Registering Officer noticed a rare portrait of Sri Krishna Chaitanya Mahaprabhu giving audience to Gajapati King Prataparudra Deva of Orissa. The folios, consisting of seven palm-leaves, also depict the figures of Nityananda, Svarupa Damodara, Vakresvara, Kashi Mishra, Haridasa Thakur, Gopinatha, Rajapatra, Sridhara, Puri Gosain, Shikhi, Mahanti, Rai Ramananda and Shuklambara. The painting with Hare-Krishna *mahamantra* in Sanskrit language and Orissan characters was painted by an artist, named Managovinda Mahapatra in Kalinga *Samvat* 924 (AD 1517). This painting, executed m black ink, is now in the possession of Shri Shrivatsa Goswami of Vrindavan.

64. MEDIEVAL SCULPTURES, HASTINAPURA, DISTRICT MEERUT.—C. P. Singh of the Northern Circle of the Survey discovered two fragmentary door-jambs of a temple assignable to *circa* eighth-ninth century AD from the village.

65. P. G. WARE AND KUSHANA POTTERY, MADIIYA GANCA CANAL, DISTRICT MEERUT.—C. P. Singh of the Northern Circle of the Survey collected sherds of the Painted Grey Ware and Kushana pottery from a dig of the canal, near Mavana.

WEST BENGAL

66. MEDIEVAL SCULPTURE AT DELANG, DISTRICT PURULIA.—Subhra Bosc of the Eastern Circle of the Survey noticed a Jaina image of Santinatha in an ancient site.

V. RADIOCARBON AND THERMOLUMINESCENCE DATES

1. RADIOCARBON DATES

During the year under review, the following radiocarbon dates[1] were measured at the Physical Research Laboratory, Ahmadabad. The sites[2] have been arranged Statewise and alphabetically. The dates arc based on radiocarbon half-life value of 5730±40 years. The year 1950 is the base year for conversion into BC, AD scale. All the dates are uncorrected for 14C/12G variations.

SAMPLES FROM INDIA

Madhya Pradesh

1. BAGHORE, SON VALLEY, DISTRICT SIDHI

PRL-711. Middle Palaeolithic deposit (?); calcium carbonate from nullah cliff 16m above river bed; sample no. AU/Sidhi-S/37-2. — 12810 + 220 / -210 (10,860 BC)

PRL-714. Upper Palaeolithic deposit (?); charcoal from Baghore III; Trench I, layer 3; depth 0.54 m; sample no. AU/Sidhi-S/80-5. — 6660±180 (4710 BC)

PRL-715. Mesolithic deposit (?); charcoal from Baghore II, layer 2a; depth 0.61-0.69 m; sample no. AU/Sidhi-S/80-6. — 8330 ±220 (6380 BC)

2. GERWA WELL, SON VALLEY, DISTRICT SIDHI

PRL-710. Middle Palaeolithic deposit; calcium carbonate concretions from a well; depth 10-50 m; sample no. AU/Sidhi-S/16 B-1. — 26850 + 820 / —850 (24,900 BC)

1Contributed by D. P. Agrawal, R. V. Krishnamurthy, Sheela Kusumgar and R. K. Pant of the Physical Research Laboratory, Ahmadabad. For further details of the samples, the submitting institutions may be contacted.

2Samples submitted by: 1-2 Allahabad University, Allahabad; 3 Department of Archaeology and Museums, Madhya Pradesh; 4 Archaeological Survey of India; 5-6 Physical Research Laboratory, Ahmadabad; 7 Indian Institute of Advanced Study, Simla; and B. B. Allchin of Wolfson College, Cambridge (U.K.).

3. DANGWADA, DISTRICT UJJAIN

PRL-693. Malwa culture; Charcoal from Trench VII, layer 6; depth 3 m.	3370±100 (1420 BC)

Maharashtra

4. DAIMABAD, DISTRICT AHMEDNAGAR

PRL-655. Buff-and-cream ware deposit; charcoal from Trench Z4, layer 10 A; depth 2 m; sample no. DMD/43/1977-78.	3660±110 (1650 BC)
PRL-657. Late Harappan deposit; charcoal from ZD 60; hearth sealed by layer II; depth 2-30 m; sample no. DMD/53/1978-79.	3220±110 (1250 BC)

Rajasthan

5. SHERGARH, DISTRICT JODHPUR

PRL-574. Caliche; 0.70 m below surface; sample nos. 6-28.	22550+560 -520 (20600 BC)
PRL-575. Caliche; 2.50-2.60 m below surface; sample no. C 29.	31910+2930 -2160 (29960 BC)
PRL-576. Caliche 2.80-3 m below surface; sample no. C 30.	34200+2080 -1660 (32250 BC)
PRL-577. Caliche; 3.28-3.65 m below surface; sample no. 31.	37380+4840 -3030 (35430 BC)

6. DIDWANA, DISTRICT NAGPUR

PRL-644. Lake sediments; lake mud from a well; Trench DIAI, top of Formation III; depth 1.12-1.17 m; sample no. DID/80/1.	4180±130 (2230 BC)
PRL-648. Lake sediments; lake mud from DIA I well, bottom of Formation V; depth 3.55-3.60 m; sample no. DID/80/5.	7460±160 (5510 BC)

PRL-650. Lake sediments; lake mud from DIA 1 well, bottom of Formation VII; depth 4.50-4.55 m; sample no. DID/80/7.	12820+370 -350	(10,870 BC)
PRL-651. Soil carbonate; Palaeosol with Acheulian tools; depth 9.00 to 9.20 m; sample no. DID/80/8.	24710+1220 -1070	(22,730 BC)

Uttar Pradesh

7. SRINGAVERAPUR, DISTRICT ALLAHABAD

PRL-669. Black-slipped and black-and-red ware deposit; charcoal from Trench YA/3, Qd. 3, layer 18; depth 8.47 m-8.65 m; sample no. 2.	2700±130	(750 BC)
PRL-671. Red ware deposit; charcoal from Trench 2B 1, Qd. 2, layer 10 E; depth 4.95-5.05 m; sample no. 5.	2130±150	(180 BG)

SAMPLES FROM ABROAD

Pakistan

8. REHMANDHERI, DISTRICT DIK

PRL-673. Kotdijian deposits; charcoal from Trench BW/9, layer 5; depth 1.30 m.	4010±130	(2060 BC)
PRL-674. Early Kotdijian deposit; charcoal from Trench BW/9, layer 10; depth 2 m.	4110±160	(2160 BC)
PRL-675. Pre-Kotdijian deposit; charcoal from Trench BW/9, layer 15; depth 3.75 m.	4530±110	(2580 BC)
PRL-676. Pre-Kotdijian deposit; charcoal from Trench BW/25, layer 6; depth 5.30 m.	4650±110	(2700 BC)
PRL-679. Kotdijian deposit (?); charcoal from Trench BW/4, layer 7; depth 1.60 m.	31,000	

2. THERMOLUMINESCENCE DATES

As the TL dates are being reported for the first time in the *Review* the basic principles of the method is discussed here in brief.[1] (For details, see Agarwal *et al* 1979; Aitken 1977; and Singhvi and Nambi 1979). The first set of thermoluminescence (TL) dates assayed at the Physical Research Laboratory (PRL) during 1979-80 is reported here (nos. 3 to 16), besides a report on the samples nos 1, 2 and 17) from the Health Physics Division of Bhabha Atomic Research Centre (BARC), Bombay.

Thermoluminescence is the light emitted by a substance when heated below incandescence (red glow). It is a radiation-induced phenomenon and most minerals (e.g. quartz, feldspars) exhibit this property. The intensity of emitted light is proportional to the amount of radiation received. This light is emitted only during first heating after irradiation and repeated heatings, without re-irradiation, do not result in emission of light (fig. 17), as schematically shown below.

Radiation (I)->Heating (H)->-TL->Heat->No TL
exposure

Thus the sequence I, H, is necessary to observe TL. It is this property of TL that makes it possible to date the firing event of an archaeological object. The application of TL in dating archaeological objects is based on following facts.—

(1) Most specimens (generally clay artifacts) have a predominant clay fraction with traces of naturally-occurring minerals such as quartz, feldspars etc. The clay matrix is rich in natural radioactivity viz., uranium, thorium and potassium. The radiations emanating with the decay of these radioactive elements irradiate the minerals.

(2) The firing event of the artifacts erases the TL acquired by the minerals during their geological storage times and a fresh accumulation of TL starts due to radiation exposure from the radioactivity within the clay matrix, the surrounding soil and the cosmic rays.

(3) The laboratory heating once again releases the TL acquired since the previous firing event and this is proportional to the total radiation exposure during storage at the site (and thus the time elapsed) since the annual rate of radiation is practically constant.

Fig. 17 explains these facts schematically. The TL age equation is:

$$\text{Age (years)} = \frac{\text{TL acquired (since firing)}}{\text{Annual rate of TL acquisition}}$$

Estimation of a TL date not only requires careful laboratory procedures but also depends critically on sample collection and handling procedures and the date on the site supplied by the excavator.[2] Thus it is essential to have a sample of the surrounding soil, an estimation of *in situ* water content and the excavator's estimate of variation in water-table during antiquity, as also information on the presence of stones in the vicinity of the object and change of soil type (if any) immediate to sample. It may be pointed out that even after all the field precautions are taken, a sample may yet be found to have unsuitable TL properties e.g., sometimes the minerals present may not be able to store TL over long periods of time or the radiation rate may have been changing with times. In such cases, either a sample is rejected or the date is given with necessary comments towards its reliability.

[1]Contributed by A. K. Singhvi, Y. P. Sharma and D. P. Agrawal of Physical Research Laboratory, Ahmadabad.

[2]Sample data sheets and details on sample collection and handlings are available with the authors.

For a typical TL date, in general, two error estimates are given. The first error estimate is a measure of scatter around the average of the individual dates of sample from the same context and the second gives total error taking all uncertainities into account. In cases, so far as PRL is concerned, where only one sherd was analyzed for a context, only the second error is quoted. This first error can be used while comparing dates from different contexts from the same site whereas the second should be used for any intercomparison, e,g., with radiocarbon

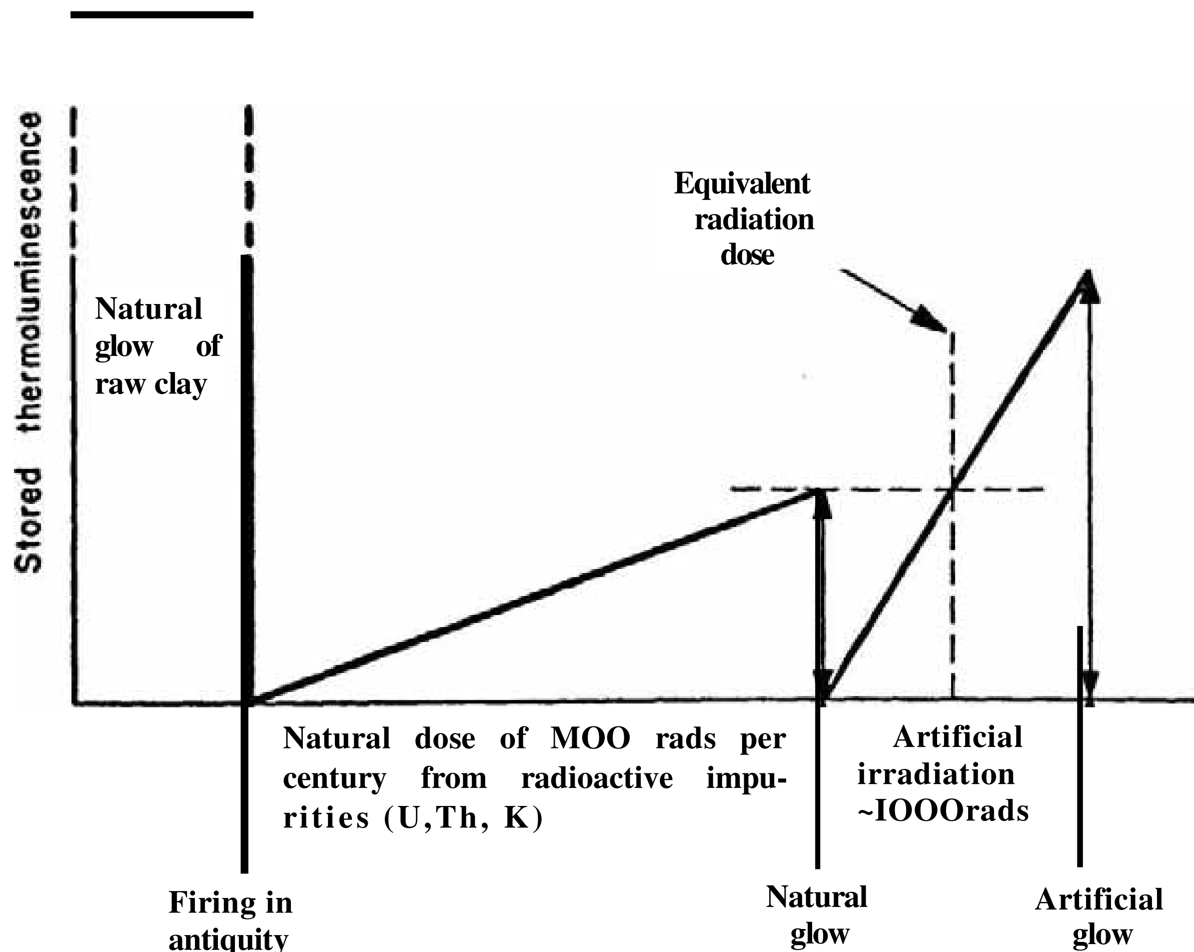


FIG. 17. *Schematic representation of the basis of Thermo luminescence dating*

dates. All the dates are in years BP. The radiocarbon dates refer to 1950 as the base year and the TL dates to 1980 as the base year.

The TL method is applicable to fired pottery, burnt bricks, terracotta, heated rocks, hearth linings, heated cherts, flints etc. The method is not applicable to any metallic or organic specimens.[1]

1References : D. P. Agrawal, N. Bhandari and A. K. Singhvi, *Man and Environment,* 3, 78, 1979; M. J. Aitken, *Antiquity,* LI, II, 1977; A. K. Singhvi and K. S. V. Nambi. *Bull. Rad. Prot.* 2(4), 89, 1979.

MUCHCHATLA CHINTAMANU GAVI, DISTRICT KURNOOL[1]

1. BARC sample: burnt clay samples from a seemingly fire place in an ancient cave;location, Muchchatla Chintamanu Gavi (15°25' N 78°8'E); time of excavation, March 1979; time of TL dating, October 1979 (TL age refers to this base); and TL Dating date, (Fine Grain Technique).

Sr. no.	*particulars*	*etstimate*
1.	Palaeodose Equivalent, gamma rads	3255
2.	k-factor	034
3.	Gross alpha countratc* (cph Cm"^{2})	087
4.	K-content (wt. %)	0003
5.	Saturated water uptake (wt %)	11.2
6.	Cosmic dose rate (mrad y-^{1})	5.0
7.	TL effective nett dose rate ** (mrad Y^{1})	187.0

* From 13.80 Cm^2 of infinite thickness

** Assuming 27% of saturated water uptake

TL AGE with predicted error : 17405 yrs. BP± 10%

Gujarat

DHEGAM, DISTRICT BAROACH[2]

2. BARC sample : kankar nodules in a buried soil profile; location, stratigraphic sections of the lower Narmada river-valley near Dhegam (21°42'N 72° 55' E); time of excavation, December 1979; time of TL Dating, March 1980 (TL age refers to this base); and TL Dating date, (Fine Grain technique).

Sr. no.	*particulars*	*estimate*
1.	Palaeodose Equivalent (gamma rads)	4799±1%*
2.	K-factor	007

1Contributed by K. S. V. Nambi of the Health Physics Division, Bhabha Atomic Research Centre, Bombay and M. L. K. Murty, Deccan College Post-graduate and Research Institute, Pune.

2Contributed by K.S. V. Nambi of the Health Physics Division of Bhabha Atomic Research Centre, Bombay and K. T. M. Hegde, Department of Archaeology and Ancient History, M. S. University of Baroda.

Sr. no.	particulars	estimate
3.	Gross alpha countrate (cph)**	
	(a) nodules	0.65
	(b) soil	2.02
4.	K-analysis (wt %)	
	(a) nodules	0.40
	(b) soil	0.80
5.	Saturated water uptake (wt. %)	
	(a) nodules	6.40
	(b) soil	21-60
6.	Environmental TLD gamma dose rate (mrady-[1])	1221 ±*
7.	TL effective nett dose rate (mrady-[1])	2092***
8.	Calculate	

* Scatter in 2 measurements ** From 13"86 Cm^2 of infinite thickness ***
Assuming 21 % of saturated water uptake for alpha and beta dose rates

TL AGE with predicted error 22890 yrs. BP±8%

Punjab

SANGHOL (30°20' N; 75° 15' E.), DISTRICT LUDHIANA[1].—

3. PRL : TL 1. Late Harappan Bara Ware deposit, pottery; locus: SGL-II; Trench : EX-1, layer 40. — 3120 (±----- ; ±270) 1140 BC
   Comments : 14_cdate on associated charcoal is (PRL-513),3640±150BP.

4. PRL:TL 6. grey ware and black slipped ware deposit; pottery; locus: SGL-II; trench: EX-1; layer 31. — 2100 (± -----; ±180) 120 BC

5. PRL : TL 7. Late Harappan Bara Ware deposit; pottery; locus; SGL-II; — 3220 (± -----; ±450) 1240 BC

6. PRL : TL 9. Latter phase of Late Harappan Bara deposit; pottery; locus: SGL-II; trench: EX-1; layer 35. — 3110 (± ---- ; ±270) 1130 BC

1Serial nos. 3 to 16 contributed by A. K. Singhvi, Y. P. Sharma and D. P. Agarwal of Physical Research Laboratory, Ahmadabad. Samples submitted by : 3 to 8 G. B. Sharma, Department of Archaeology and Museums, Punjab; 9 V. N. Misra, Deccan College Post-graduate and Research Institute, Pune; 10-16 B. B. Lai, Indian Institute of Advanced Study, Simla and K. N. Dikshit, Archaeological Survey of India, New Delhi.

7. PRL : TL 10. Early phase of late Harappan Bara deposit; pottery; locus ; SGL-II; trench : EX-1; layer 46. — 4130 (± ----- ; ±320) 2150 BC; 3930 (± ----- ; ±310) 1950 BC

Comments: the material exhibited loss of redioactivity. The second estimate may be more appropriate.

8. PRL : TL 14. Painted Grey Ware and Bara Ware deposit (?); pottery; locus; SGL-II; trench: EX-1; layer 33. — 1760 (± -----; ±210) AD 220

Comments : the date is anomalously younger than expected.

Rajasthan

BAGOR (74°23'E.; 25°21' N.), DISTRICT BHILWARA

9. PRL:TL 42. Bagor Ware deposit; pottery; locus, sample from depth 0.41-0.55m from a sand dune which also yielded microliths. — 2110 (± ----- ; ±210) 130 BC; 2010 (± -----; ±200) 30 BC

Comments: the material exhibited loss of radioactivity. The second estimate may be more appropriate.

Uttar Pradesh

SRINGAVERAPURA (25° 30N'.; 82 E.), DISTRICT ALLAHABAD

10. PRL : TL 21. Red ware associated with pre-NBPW black-slipped ware deposit; pottery; locus: trench SVP-1, square YA3, Qd. 3; layer 17. — 2660 (± ----- ; ±280) 680 BC

11. PRL : TL: 24(1). Pre-NBPW black-and-red ware deposit; pottery; lotus: trench: SVP-1, square YA3, Qd. 3; layer 17. — 2769 (± ----- ; ±400) 789 BC

12. PRL : TL : 24(2). Pre-NBPW black-and-red ware deposit; pottery; locus: trench SVP-1, square YA3, Qd. 3; layer 17. — 2690 (± ---- ; ±280) 710 BC

13. PRL : TL 29. Pre-NBPW black-slipped ware deposit; pottery; locus: trench SVP-1, square YA3, Qd. 3; layer 18. — 2743 (± -----; ±300) 763 BC

    Comments : ^{14}C dates on associated charcoal is (PRL-669), 2700±130 BP.

14. PRL : TL 33(1). Ochre-coloured Ware deposit; pottery; locus; trench SVP-1, square YA3, Qd. 3; layer 19E. — 2900 (± -----; ±380) 920 BC
15. PRL : TL 33(2). Ochre-coloured Ware deposit; potter}'; locus: trench SVP-1, square YA3, Qd. 3; layer 19E. — 2855 (± -----; ±270) 875 BC
16. PRL : TL 38(1). Ochre-coloured Ware deposit; pottery; locus; trench SVP-1, square YA3, Qd. 3; layer 19E. — 3015 (± -----; ±280) 1035 BC

MATHURA, DISTRICT MATHURA.[1]

17. BARC sample : red ware pottery; location, MTR-8 Amberish Tib XA-1, Qd_3,2h and 2g, 2.65 m depth; time of excavation, April 1976 (done by ASI); time of TL dating, April 1978 (TL age refers to this base); and TL Dating date, (Fine Grain Technique).

Sr. no.	*particulars*	*estimate*
1.	Archaeological Equivalent dose, gamma rads	1280
2.	k-factor	008
3.	Gross alphs count rate (cph Cm"[2]) of pottery	4̄60
4.	K-content (wt %)	
	(a) pottery	3.50
	(b) soil	2.68
5.	Saturated water uptake (wt %)	
	(a) pottery	19.50
	(b) soil	34.8
G.	Environmental TLD gamma dose rate (mrady-[1])	194.4
7.	TL effective nett dose rate* (mrady-[1])	662.2

*Assuming 50% of saturated water uptake

TL AGE with predicted error 1934 yrs. BP±17%

1Contributed by K. S. V. Nambi, R. Sasidharan and S. D. Soman of the Health Physics Division, Bhabha Atomic Research Centre, Bombay.

VI. PALAEOBOTANICAL AND POLLEN ANALYTICAL INVESTIGATION[1]

SAMPLES FROM INDIA

ANDHRA PRADESH

1. RAMAPURAM, DISTRICT KURNOOL.—The Chalcolithic-Megalithic phase of Ramapuram has yielded through 'Floatation Technique' some poorly-preserved grains of cultivated species of six row barley i.e. *Hordeum vulgare* Linn.

2. VEERAPURAM, DISTRICT KURNOOL.—Excavations have brought to light about ten species of wild and cultivated plants from this site variously from the megalithic, early historical and overlap phase of the two. Collected samples include uncarbonized seeds covered with ashy substance of common pea *(Pisum arvense* Linn.) and fruitcoat (endocarp) of Indian jujube *(Zjzyphus jujuba* Lamk.) but most of the samples are in carbonized condition. The summary of grain findings and their cultural provenance is given below.—

Tear of collection	*Megalithic phase* (*c.* 1000-300 BC)	*Overlap phase of Megalithic and Early historical*	*Early Historical* (*c.* 300-50 BC)
1978	*Hordeum vulgare* Linn; *Paspalum Scrobicutation* *Dolichos lablab* Linn.; *Terminalia* Sp.; *Qzyphus jujuba* Lamk.		*Oryza sativa* Linn.; *Dolichos lablab* Linn.;
1979	*Paspalum scrobiculatum* Linn.; *Phaseolus mungo* Linn.; *Phaseolus aureus* Roxb.; *Hordeum vulgare* Linn.; *Oryza sativa* Linn.; *Dolichos biflorus* Linn.; *Dolichos lablab* Linn.; *Terminalis* sp. ;		*Oryza sativa* Linn.; *Dolichos lablab* Linn.; *Phaseolous mungo*

[1] Contributed by: 1-3, 5 and 8 Deccan College Post-graduate Research Institute, Pune; 4 North-western Circle of Survey, Srinagar, investigation carried out by G. M. Buth of Department of Botany, University of Kashmir; and 7, 10 to 12 Vishnu Mittre and Aruna Sharma of Birbal Sahni Institute of Palaeobotany, Lucknow. Samples submitted or collected by : 1 M. D. Kajale, Deccan College Post-graduate Research Institute, Pune; 2 T. V. G. Shastri, Birla Archaeological and Cultural Research Institute, Hyderabad; 5-6 V. S. Wakankar, Vikram University, Ujjain; 7 S. A. Sali, South-western Circle, Aurangabad; 9 M. D. Kajale, Deccan College Post-graduate Research Institute, Pune; 10 G. R. Sharma, University of Allahabad; 11 P. R. Sengupta, Vishnu Mittre and A. K. Saxena; and 12 Siran Deraniyagata, Assistant Archaeological Commissioner, Department of Archaeology, Sri Lanka.

Year of collection	*Megalithic phase* (*c.* 1000-300 BC)	*Overlap phase of Megalithic and Early historical*	*Early Historical* (*c.* 300-50 BC)
1980	*Oryza sativa* Linn.; *Hordeum vulgare* Linn.; *Dolichos biflorus* Linn.; *Dolichos lablab* Linn.; *Phaseolus mungo* Linn.; *Phaseolus aureus* Roxb.;	*Phaseolus mungo* Linn.; *Dolichos lablab* Linn.	*Dolichos lablab* Linn.; *Pisum arvense* Linn.

JAMMU AND KASHMIR

3. BURZAHOM, DISTRICT SRINAGAR.—In order to study palynological aspects of the Late Quaternary formations in the Kashmir valley, field-work was carried out by S. N. Rajaguru, M. D. Kajale and Kiran Kaul. For this purpose ninety soil samples belonging to different stratigraphic units of the Late Quaternary formations, covering dark brown bands and inter-layering yellowish brown loam, were collected at an interval of 5 cm each from the pre-habitational cliff-section, which was exposed on the western face of the Neolithic mound at Burrahom. No palynological samples were collected from the habitational deposits.

Of the collected samples, which were systematically collected avoiding surface as well as intersample contamination, twenty-five representing dark bands and yellowish brown loam have so far been analyzed using Faegri Iversen's HF technique. No acytolysis was carried out on these samples.

The preliminary studies indicate that both dark bands as well as loam deposits are not rich in pollen as well as spores. However, loam deposits have been found to be relatively richer in pollen grains belonging to grasses (family *Graminae)* and family *Compositae.* Detailed pollen morphological work is in progress.

4. SEMTHAN, DISTRICT SRINAGAR.—Samples collected from the excavations at Semthan comprise carbonized grains, seeds of cultivated and wild plants and charcoal pieces. While the samples from the upper and middle levels produced no tangible results, those collected from the lower level (Period I) at a depth varying from 6.39 m to 6.80 m revealed valuable information. G. M. Buth carried out the palaeobotanical investigations on the samples, the results of which are summarized below.

Cultivated assemblage (pl. XXXVIII) comprises wheat, barley and rice. The wheat grains could be grouped into two lots, of which the longer and broader, with conspicuous dome on the side shows close resemblance with *Triticum vulgare* (bread wheat). The other lot consists of spherical grains with deep furrow similar to *Triticum sphaerococcum* (short wheat or Indian dwarf wheat). Barley is characterized by longitudinal striations on the husk and twisted grains. The barley grains were identified as *Hordeum vulgare* Linn, (hulled, six row type). The paddy grains are characterized by chess-board pattern of the husk typical of *Oryza* and belong to *0. sativa* Linn.

The grains of wheat, barley and rice were subjected to statistical analysis for determining the frequency of different grains, and it was found that wheats show high frequency followed by barley and then a few grains of rice and paddy.

Wild seeds include those of *Trifolium* sp. (clovers), *Medicago* sp. (Al falfa), *Lithospermum arvense* and *Avena fatua* (wild oat). Few broken seeds of *brunus* sp. (aparicot/plum) were also identified.

The charred wood pieces revealed conifer attributes and belong to *Pinus walli chiana* jackson (blue pine or *Kail).*

MADHVA PRADESH

5. DANGWADA, DISTRICT UJJAIN.—The following plants were identified from this early historic site.—

trench	*layer*	*findings*	*botanical name*
II	10	Lentil	*Lens esculents* Mocnch.
II	23	Indian jujube	*Zizyphus jujuba* Lamk.
IV	8	Rice	*Orvza saliva* Linn.
IV	9	Rice	*Oryza saliva* Linn.
		Horse gram	*Dolichos biflorus*
		Green gram	Phaseolus aureus Roxb

6. KAYATHA, DISTRICT UJJAIN.—*Triticum* sp. (wheat) and *Dolichos biflorus* Linn (horse gram) were recovered from Trench II of this chalcolithic site.

MAHARASHTRA

7. DAIMABAD, DISTRICT AHMEDNAGAR.—In continuation of the previous year's work *(1979-80,* p. 113) investigations were carried out on the plant remains (pl. XXXIX) from the site. The fragmentary leaf impression from the Savalda phase has been found to be of a grass (fig. 18).

The carbonized food grains from the Malwa culture have been identified as of wheat *(Triticum sphaerococcum, T. compactum),* barely *(Hordeum* spp.), ragi *(Eleusine coracana)* and six kinds of pulses and beans *(Phaseolus* spp., *Vigna* spp., *Lens esculenta* etc.). Fruit stones of *Zizyphus* also occur.

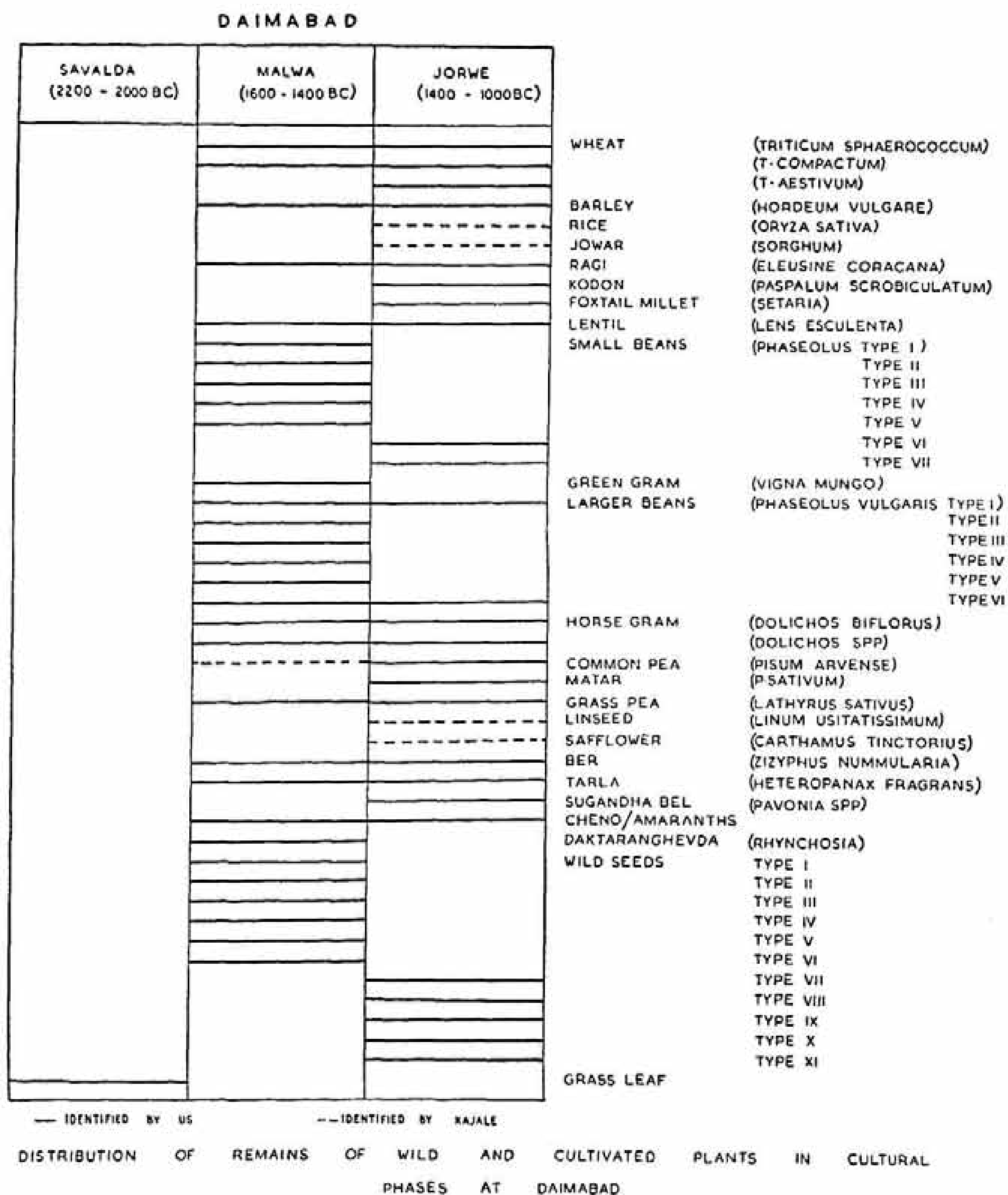
Similar grains have been identified in the samples from the Jorwe phase but grains of *Paspalum scrobiculatum, Setaria* spp., *Pisum arvense* and *P. Sativum* are the additional food grains in the Jorwe phase; these are not observed in the samples from the Malwa phase.

The grains of wheat (165-173) outnumber those of barley (35-46) in both the Malwa and Jorwe phases.

Variability in size and shape has been observed in grains of *Eleusine* and in some pulses. It is under investigation.

Setaria and *Pisum sativum* are the new records for this site. The occurrence of *Eleusine* in the Malwa phase has not been reported earlier by Kajale *(Current Science,* vol. 26, 1977, pp. 818-819). Grains of *Sorghum,* rice, *Linum usitatissimum* and *Carthamus tinctorius* reported earlier from Daimabad by Kajale have not been recognized in the present samples.

8. NAIKUND, DISTRICT NAGPUR.—The Megalithic habitational site of Naikund yielded the following grain assemblage: rice *(Oryza sative* Linn.), Kodo millet *(Paspalum scrobiculatum* Linn.), field pea *(Pisum arvense* Linn.), lentil *(Lens esculenta* Moench), black gram *(Phaseolus mungo* Linn.) and Indian jujube *(Zizyphus jujuba* Lamk).



DISTRIBUTION OF REMAINS OF WILD AND CULTIVATED PLANTS IN CULTURAL PHASES AT DAIMABAD

Fig. 18

9. INAMGAON, DISTRICT PUNE.—The chalcolithic Inamgaon *(c.* 1600-17 BC) has yielded evidence of grains of both wild as well as cultivated species of plants. Cultivated plants consist of wheat *(Triticum* sp.), barley *(Hordeum vulgare* Linn.), lentil (*Lens esculenta* Mocnch,), horse gram *(Dolichos biflorus* Linn.), hyacinth bean *(Dolichos lablab* Linn.), field pea *(Pisum arvense* Linn.), field pea *(Pisum arvense* Linn.), black gram *(Phaseolus aureus* Roxb.), grass pea *(Lathyrus sativus* Linn.)

The wild plants comprise Indian jujube *(Zizyphus jujuba* Lamk.), wild date *(Phoenix sylvestris* Roxb), beleric myrabolan *(Terminalia* sp.), *Pongamia* sp., and Indian cherry *(Cordia myxa* Linn.).

UTTAR PRADESH

10. MAHAGARA, DISTRICT ALLAHABAD.—Two carbonized grains discovered in April 1978 from the Neolithic horizon of this site (locus XXXVI-XXXVII, erosional pit 1, depth 2-60-2.77 m) have been on examination referred to as barley *(Hordeum vulgare),*

11. DADAPUR, DISTRICT LUCKNOW.—Imprints of rice have been found in all kinds of potsherds whereas *Paspalum scrobiculatum* has been observed in brown-coloured handmade potsherds with slip and in the red ware. In the latter have been recognized a fruit of a wild grass *Ischaemum rugosum,* a species which occurs wild in Uttar Pradesh, Madhya Pradesh, Bihar etc. It is considered to be a fodder grass of western India. There are indications of the occurrence of both wild and cultivated strains of *Oryza* in the imprints on postsherds.

Four samples for pollen analysis collected from the archaeological section at the site showed absence of pollen.

SAMPLES FROM ABROAD

SRI LANKA

12. KITULGALA, BELI-LENA.—Numerous fragmentary carbonized remains, possibly of seed or fruit, have been found in the samples received from Colombo. It appears on possible reconstruction of fragments that the seed or the fruit was globose about 1-2 mm in diameter with a centrally-placed hole running half the length of the seed or nearly throughout the seed. Hilum (attachment scar) was perhaps located at the base. The remains at the present state of study may be referred to as wild seeds or fruits. Further work is in progress.

VII. MUSEUMS

1. GOVERNMENT MUSEUM, AHAR.—The extension work of the Museum building was undertaken and completed.

2. ARCHAEOLOGICAL MUSEUM, AMARAVATI.—An exhibition of newly-acquired twelve sculptures from the Sri Amaresvarasvami temple and about fifty photographs of the Buddhist sites from Andhra Pradesh was held in the Museum.

3. GOVERNMENT MUSEUM, BHARATPUR.—The Museum acquired three sculptures and a hoard of three hundred sixty-six coins from Jiwad and Mewara of Wair Tehsil.

4. STATE MUSEUM, BHOPAL.—The Prehistoric Gallery of the Museum is being arranged. It will have a painted rock-shelter in it.

5. ARCHAEOLOGICAL MUSEUM, BODH GAYA.—An inscribed image of Tara was a new addition to the collection of the Museum.

6. PRINCE OF WALES MUSEUM OF WESTERN INDIA, BOMBAY.—The following were the important acquisition: three silver medals, one of Sri Raja Mayurdhwaj Sinhaji issued from Halvad dated in Samvat 1928 (AD 1941) and the other two issued by the same Raja from Dhrangadhra, one datable to Samvat 1998 (AD 1941) and the other with the legend *Sri Shakti Prasadena,* received as a gift from the Maharaja of Dharangadhra New Delhi: and two stone female dancers (sizes: 72 x 22 x 11 cm and 72 x 14 x 10 cm), dated to thirteenth century AD from Rajasthan, received on long-term loan from the Director General, Archaeological Survey of India.

In the Sculpture Gallery, printed labels wherever missing were provided. All pedestals were repainted, while four wall-cases containing Gandhara stone sculptures and stuccos were provided with top-light. Some sculptures from the reserve collection have been exhibited, and amongst them are: Gaja-Lakshmi from Pitalkhora, Brahma from Elephenta, dancing Vaishnavi from Madhya Pradesh and Vaikuntha Chaturmurti from Kashmir.

The Museum organized second Coomaraswamy lectures on 'Some Aspects of Art and Architecture of Coastal Maharashtra' delivered by M. N. Deshpande on 9 and 10 September, 1980.

7. ASUTOSH MUSEUM OF INDIAN ART, CALCUTTA.—During the year under review the Museum was engaged in the work of reorganization and classification of the collection of archaeological finds from Chandraketugarh in 24 Parganas. The Museum organized archaeological reconnaissance of sites and few other places in the adjacent areas including Basabari, Hadipur, Haroah, Hatipara, Khas Balanda and Singarh along the course of the river Vidyadhari and collected a number of terracottas, beads, cast and copper coins, potsherds etc. Noteworthy among them is a terracotta male figurine, datable to the second century BC.

8. INDIAN MUSEUM, CALCUTTA.—A new coin gallery, with about two hundred specimens of different types of numismatic issues covering a period from the fifth century BC to the twentieth century AD is being set up along the modern lines accompanied by charts, drawings and photographs.

The new acquisition includes: bronze image of Manasa, a fine specimen of the Pala art, of the eleventh century AD ; bronze images of Durga and Parvati and of an unidentifiable female deity ascribable to the fourteenth-fifteenth century AD; two stone sculptures; a miniature stone temple, the top of which depicting twenty-four Tirthankars on its four faces; a stone image of Manasa (?) datable to the twelfth-fourteenth century AD; six palm-leaf manuscripts; and one manuscript on handmade paper. Amongst the palm-leaf manuscripts, the most important is the *Dohakosha* by Saraha brought from by Haraprasad Shastry; others deserving special mention are those of *Apahasiddhi, Kshanabhangasiddhi* and *Subhasitasamgraha.* The handmade manuscript contains illustrations of *mudras* and is dated to 852 Newari *Samvat.* Of the new collections of coins and medals, mention may be made of a gold *mohur* of Jahangir depicting his portrait, a copper coin of the East India Company, a brass medal of George V and a silver medal of the Azad Hind Government. An ivory plaque depicting Krishna-*lila*, a carved wooden door from Orissa and forty-three oil and water colour paintings worth special mention amongst the art objects acquired during the year.

A mobile exhibition on 'Indian History and Archaeology' mounted on the Museo-bus covered a distance of more than eight hundred kilometer through the five districts of West Bengal. Nearly 55,000 people visited the exhibition. On the occasion of the 290th foundation year of the city of Calcutta, an exhibition entitled 'Locality Calcutta' was organized in August 1980. About one hundred archaeological objects like sculptures, coins etc., all hailing from the geographical limit of Calcutta were displayed. An exhibition titled 'Epigraphical Wealth of Bengal in the Indian Museum' was organized in January 1981 on the occasion of the 200th year of the study of Epigraphy in India. Apart from snowing stone inscriptions, copper-plates, coins and so on, a corner depicting the history of the decipherment of inscriptions of Bengal was also arranged. Of the exhibits of the month arranged regularly mention may be made of 'Indoor Games from Mohenjadaro to Murshidabad' and 'Durga in medieval Indian Art'.

9. STATE ARCHAEOLOGICAL MUSEUM, CALCUTTA.—The State Archaeological Gallery of West Bengal was shifted from its old premises to a renovated spacious building at 1 Satyen Roy Road, Behala, and it has now been rechristened as the State Archaeological Museum. It was formally inaugurated on 16 August, 1980.

One four-armed image of Vishnu, in black chlorite, collected from the village Suki, P. S. Nabagram, District Murshidabad has on its pedestal an inscription in the proto-Bengali characters of the eleventh century AD. The inscription reads *Sat-bibhu Sri Bahurupasya.* One of the two seated bulls, in Khondolite, from Chirulia, P. S. Contai, District Midnapur, bears an inscription in the Oriya characters of about the sixteenth century AD. From the village Mangalpota, P. S. Garbeta, District Midnapur, were collected two inscribed brass and one iron cannon.

10. BHURI SINGH MUSEUM, CHAMBA.—The Museum acquired through purchase two copper-plates recording the land grants made by a Raja of Chamba in the sixteenth century AD.

11. GOVERNMENT MUSEUM, CHITTAURGARH.—The Museum's collection is enriched by the acquisition of thirty-three sculptures from Meja Dam area. Six new showcases were also prepared for the display of arms and armaments.

12. S. B. M. GOVERNMENT MUSEUM, CUDDAPAH.—In the Museum were displayed coins, Celedon wares, armours and weapons, bronzes, modern paintings and miniature paintings. All the sculptures were labelled and charts prepared wherever necessary.

13. MAHARAJADHIRAJA LAKSHMISHWAR SINGH MUSEUM, DARBHANGA.—At present the museum has seven galleries open to the public while a few more are expected to be added in the near future. The important exhibits are: big marble tables, Oriental wooden furniture made of Chinese, Japanese and Burmese wood; an astrologer's machine from England; royal chairs and candle-stands of tusks; palanquins; sofa-set and elephant *hudas* of ivory; royal bed and personal furniture, of the Maharajadhiraja and his brother Rameshwar Singh, made from silver and gold; silver studed *palki* and *nalki;* sedan chair; and arms and armour.

The reserve collection of the Museum includes silver medals, buttons, wooden utensils and imitations of fruits; a mat of ivory thread, carved flower vases of China clay, besides bronze, marble and ornamental art works of ivory, wood and metals.

14. INDIAN WAR MEMORIAL MUSEUM, RED FORT, DEHLI.—Four galleries were reorganized in the Museum and are being thrown open to the public soon.

15. STATE MUSEUM, DHUBELA (CHHATARPUR).—During the year under review a new gallery for the ancient arms and armour was set up in the Museum.

16. GOVERNMENT MUSEUM, DUNGARPUR.—Steps have been taken for the construction of a new Museum building.

17. GAYA MUSEUM, GAYA.—During the year under review the Museum acquired five stone sculptures of the nineth-tenth century AD from Pali, near Konch, and one hundred forty coins through gift and purchase, of which the following are noteworthy: stone images of Lakulisa in the *lalitasana* and Uma-Mahesvara; one punch-marked coin; thirteen copper coins of the Kushanas; one coin each of Ghiyashudin Tughlaq and Alauddin Muhammad Shah II; and the coins of the Native States and British India.

18. GOVERNMENT MUSEUM, GULBARGA.—The Museum collection is further enriched by the addition of a terracotta figurine of the second century AD from Sannathi, a Buddhist site, District Gulbarga.

19. GUJARI MAHAL MUSEUM, FORT, GWALIOR.—New galleries for exhibition of paintings and terracottas have been rearranged.

20. ARCHAEOLOGICAL MUSEUM, HAMPI.—Ten small sculptures representing Vishnu, Rama and Vaishnava teachers were displayed in two wall showcases in the Gallery 2 of the Museum. Gallery 4 was divided into two sections, one for the display of miscellaneous objects and the other exhibiting some memorial stones like *viragalas* and *mastikals.*

An aerial view of the Hampi ruins and a small-scale map showing the Hampi monuments were displayed near the entrance to the Gallery 1 and in the corridor of the Museum respectively. Besides, a map of south India showing the extent of the Vijayanagar empire was also displayed near the front verandah of the Museum.

21. GOVERNMENT MUSEUM, HASSAN.—During the year under review the Museum collection is enriched by the acquisition of : an old wooden *ratha* of Sri Ramadevaru of Chunchakatte; three copper coins one each of Mysore Wodeyars, East India Company and the British times; four hero-stones from Kagodu; images of Bhairava, Ganapati, Lakshmi from Mallarajapatna; one stone image each of Vishnu and a goddess from Satyamangala; three *sati*-stones from Rayara Koppalu; two male attendants and one *prabhavali* from Yaliyur; three coins from Rayara Koppala and Arsikere, two *sati*-stones from S. M. Koppala; *bhutagana* of brass;

a silver cup and one sword from Halasur and Sri Mallappa; and one *sati*-stone from Dendiganahalli.

22. GOVERNMENT MUSEUM, HAWA MAHAL.—Two German silver plates were added to the collections and displayed at the second entrance of the Museum.

23. STATE MUSEUM, HYDERABAD.—During the year under review the Museum acquired the following antiquities under the Treasure Trove Act : eight stone and one bronze sculptures; six lots of gold, silver and copper ornaments; and two thousand one hundred forty-nine coins of gold, silver, copper and lead, belonging to the Kakatiyas, Yadavas, Ikshvakus, Muslim rulers, Vijayanagara empire and the British rulers. A new gallery for Chola bronzes was also set up in the Museum and thrown open to the public.

In addition to this, the Museum organized three main exhibitions on 'Tibetan Thankas', 'Devi during Dassera Festival' and 'Satavahana Culture'.

24. CENTRAL MUSEUM, INDORE.—On the occasion of the Golden Jubilee celebration of the Museum, replicas of the Lakshmana temple at Sirpur and the Heliodorous pillar of Besnagar were installed in the Museum compound. A new gallery, displaying the important sculptures from Hinglajgarh (Mandasaur), was thrown open to the public.

25. RANI DURGAVATI MUSEUM, JABALPUR.—A new gallery containing paintings was arranged.

26. GOVERNMENT MUSEUM, JAIPUR.—Steps have been taken for proper lighting arrange ments in the showcases. Models were prepared from some of the artistic pieces while old models were repaired. During the year, preservation of museum antiquities has been taken up.

27. GOVERNMENT MUSEUM, JODHPUR.—During the year under review the Museum acquired: one inscription in Kutila script from Osian; twenty-one sculptures; three copper plates; six hundred eighty-eight coins; and seven sculptures from Shoyal and Chandravati.

Lighting arrangements in different sections were also improved.

28. GANDHI CENTENARY MUSEUM, KARIMNAGAR.—The Museum was reorganized with the addition of several new antiquities received from State Museum, Hyderabad. Important exhibits are: eleven miniature paintings; seven manuscripts; metal objects; terracottas; megalithic and early historical pottery; and some jade and textile objects. The Museum collection is further enriched by the addition of gold coins of the Yadavas, Kakatiyas, Western Chalukyas and the Vijayanagara rulers.

29. STATE MUSEUM, KOHIMA.—During the year under review the Museum displayed three sculptures viz., standing Vishnu datable to the twelfth century AD, Buddha assignable to eleventh century AD and a stupa-fragment datable to the tenth century AD the last-mentioned item received from the Indian Museum, Calcutta.

30. ARCHAEOLOGICAL MUSEUM, KONARAK.—Two hundred and fifty-three architectural fragments recovered from sand dunes of the Sun Temple were kept inside the Museum complex. Showcases and pedestals of Gallery 2 of the Museum were now veneered with laminated sheets of natural wood-colour and texture.

31. GOVERNMENT MUSEUM, KOTA.—The Museum acquired three architectural pieces belonging to the Gupta period and one pillar of the seventh-eighth century AD from Dara.

32. STATE MUSEUM, LUCKNOW.—During the year under review the Museum acquired twenty-eight objects including sculptures, terracottas, metal images, wooden objects and coins. Noteworthy finds are: head of Siva in black stone (15 x 15 cm), assignable to twelfth century AD from Jageshwar, Almora; earthern vessels (14 cm) datable to *circa* first century AD; terra-cotta human head (13 x 12 cm) assignable to the fifth century AD from Mitauli, District Lakhimpur; and clay seal with the legend *Sri Maha Devasya* in Gupta Brahmi, (4. 8 x 3.6 cm) from Teni, District Hardoi.

The Museum's Education Extension Activities made noteworthy progress during the year under review. Under the School Service Scheme special circulars introducing the programmes and activities of the Museum were sent to various educational institutions of the city. In all one hundred forty-one institutions consisting of eight thousand seven hundred fifty-six students and nine hundred nineteen teachers visited and availed of the facilities of the Museum.

The Museum organized four lectures on 'Preambles of Gupta Art aesthetics', 'Western Indian Miniature Paintings' both by R. C. Sharma, 'Avadha Ki Chitra Kala' by S. M. Naqvi and 'Hulaskhera Excavations and Achievements' by R. C. Sharma. In addition, a special seminar on 'Krishna Theme in Art' was organized in the Museum.

The Museum put up four temporary exhibitions: 'Krishna Theme in Art' in September 1980, 'Yadagar-e-sul-Ahkul' in October 1980 to mark the 400th anniversary of Akbar's policy of Sulah Kul, 'Yadagar-e-Avadi' in February 1981 on the occasion of Lucknow festival, and 'Bulgarian Exhibition' on the occasion of the anniversary of the foundation of the Bulgarian State.

33. ARCHAEOLOGICAL MUSEUM, FORT ST. GEORGE, MADRAS.—A picture of the Indo-European coinage of the eighteenth to nineteenth centuries has been displayed on specially-designed pedestal.

A new gallery, displaying acqua-prints showing different views of the city of Madras and its neighbourhood drawn by the English artists of the eighteenth-ninteenth century AD has been set up.

During the visit of the Prince of Wales a special exhibition on the East India Company records and registers, borrowed from the Tamil Nadu archives, was organized in the Museum.

34. GOVERNMENT MUSEUM, MADRAS.—Of the Treasure-trove finds the following are the metal images and objects: Devi from Nallur, Kumbakonam Taluk, District Thanjavur; Parvati with an attendant and Santanagopala from Endapalli, Manapparai Taluk, District' Tiruchchirappalli; Venugopala from Neivasal, Tirumayam Taluk, District Pudukkottai; Vishnu from Harur, Harur Taluk, District Dharampuri; two Devi images and three of Yasodakrishna from Melavattam Ponnammaravathi, Tirumayam Taluk, District Pudukkottai; two figures each of Navanita Krishna, Sridevi, Bhudevi, one Dhanvantari, besides two tripods and two cups, from Athipakkam, Kumbakonam Taluk, District Thanjavur; and two images of Kali, one big and another small, Mahishamardini, Ganesa, Ayyanar, snakehood, two saints, besides a handle of a bell, from Kiliyur, Mayavaram Taluk, District Thanjavur. Stone objects include two sculptures from Odaymbakkam, Chengalpattu Taluk and District, and a Vishnu's feet mounted on lotus pedestal from Ilangi, Tenkasi Taluk, District Tirunelveli. Some images and miscellaneous objects confiscated by the State or declared as unclaimed property were also added to the museum collection.

On the recommendation of the Art Purchase Committee three bronzes—Vyaghrapada, Nammalvar and Vedanta Desika—two Tanjore paintings, one copy of the Pattisvaram mural and twenty-eight contemporary works were obtained.

35. DISTRICT MUSEUM, MANDLA.—The Museum was taken over by the Department of Archaeology and Museums, Government of Madhya Pradesh, from the District Archaeological Association.

36. GOVERNMENT MUSEUM, MATHURA.—The Museum has enriched its collection by the acquisition of fifty sculptures, one terracotta, one coin and one bronze. The noteworthy objects are : two red standstone pieces of door-lintel (113 x 31 and 85-5 x 31 cm) with representation of a row of standing nine planets, ten incarnation, projecting amorous couples, scroll carved in the lower band and lotus carvings below, datable to *circa* tenth century AD; a red sandstone slab showing seven male figures, wearing fluted crowns (44 x 32 cm), assignable to the Kushana period; and a red sandstone snake pillar (110 x 47 cm) with seven scrpenthoods forming a canopy, also belonging to the Kushana period.

A gallery for coins has been constructed while the Govind Nagar Gallery is being opened to the public. A plaster-cast head prepared on the basis of figures carved on the Kushana coins, has been provided to the headless statue of Kanishka; this head is also displayed behind the original statue exhibited near the main gate.

The Museum took part in the Sulhe-Kul exhibition organized in the Agra Fort to highlight the Dine-Ilahi policy of the Mughal emperor Akbar. On this occasion a plaster-cast bust of Akbar was made.

37. ARCHAEOLOGICAL MUSEUM, NAGARJUNAKONDA.—Wooden screen at the back of the standing Buddha in Gallery 5 was further raised to prevent the effect of glare due to sunlight coming through the windows.

38. CENTRAL MUSEUM, NAGPUR.—During the year under review, the Archaeological Section of the Museum was reorganized. Wooden pedestals were introduced and the documentation of the sculptures in the Museum is in progress.

The Museum also participated in the excavation of Megalithic sites near Borgaon in Saoner Taluk of District Nagpur in collaboration with the Deccan College Post-graduate and Research Institute, Pune.

39. ARCHAEOLOGICAL MUSEUM, NALANDA.—The Bronze Gallery of the Museum was reorganized during the year under review. A fibre glass model of the excavated site of Nalanda was also prepared and kept in the Main Hall of the Museum.

40. STATE MUSEUM, PANAJL—Archaeological Unit of the Museum acquired sculptures of Kuvalesara from Korgaon, Perwem Taluk, Kapilesvara from Ponda Taluk, *gomukha,* fragmentary images of Vishnu and a sword from Marva in Dicholi Taluk, and a partly-broken image of Ganesa from Salavli Irrigation Dam site. The Museum displaying a group of Jaina images, a diorama of Mahadeva temple of Tamodi, printed blocks of currency notes, old Portuguese currency etc. was thrown open to the public.

41. STATE MUSEUM, PATNA.—The Museum acquired through purchase thirty copper coins of the Kushanas and four copper coins of Islamic rulers.

42. RANCHI MUSEUM, RANCHI.—During the year under review the Museum acquired four stone sculptures and four oil paintings on plywood, of which the following deserve special mention: one *amalaka* with square socket (42 cm in diameter) and an image of Simhavaham Durga (58 x 31 cm), both datable to the eleventh-twelfth century AD; one Siva-*linga* of later date from Saraikhela court of Singhbhum District; broken stone image

(26 x 21 cm), probably a Jaina deity, datable to the twelfth century AD received as donation from Shri Dukhu Karamkar of Paranpur; and oil paintings (each measuring 178 x 113 cm) depicting the four martyrs of 1857 upheaval.

43. A. S. P. GOVERNMENT MUSEUM AND RESEARCH INSTITUTE, RAJAHMUNDRY.—To the Museum collection were added three copper coins, belonging to the East India Company, three bronze and one brass sculptures, two marble and one conch-shell from Katravulapalli of District East Godavari.

44. SRI R. S. P. GOVERNMENT MUSEUM, RAJAHMUNDRY.—Eight sculptures were added to the Museum collection.

45. ARCHAEOLOGICAL MUSEUM, SARNATH.—Antiquities belonging to the Maurya and post-Maurya periods were exhibited in a wall showcase in Gallery 1 while terracottas and stone sculptures of the Gupta period in another wall showcase.

46. GOVERNMENT MUSEUM, SHIMOGA.—The Museum acquired one painting of Sivappa Nayaka in black and white from Shri Lakanatha of D.C.C. Bank and one sculpture of *chauri*-bearer from Basavapatna.

47. STATE MUSEUM, SIMLA.—During the year under review the Museum obtained through purchase, exploration or transfer fifty-two Indian miniature paintings, fifty-four terracotta objects; twenty-six wood carvings of the eighteenth century; three wood-carvings and three silver coins belonging to the Mughals from Kamlah fort in Mandi District; four Pahari bronzes; five other bronzes; nine fragmentary sculptures; one *thanka* from Kinnaur; and one hundred eleven objects of ethnographical interest and decorative art; manuscripts; and textiles.

The Museum put up an exhibition on Mother Goddess.

48. SRI PRATAP SINGH MUSEUM, SRINAGAR.—One standing image of Vishnu (44 x 21 cm) datable to the sixty century AD and another of Vaikuntha with three faces (67 x 29 cm), datable to the ninth century AD from Baramulla District were added to the collection.

49. ARCHAEOLOGICAL MUSEUM, SRIRANGAPATNA.—One engraving depicting Cornwallis receiving the hostage princess and eight photographs relating to the scene from Tipu Sultan's life have been displayed in the Museum.

50. BHARAT KALA BHAVAN, VARANASI.—Of the new additions, the following deserve special mention: stone panel of the tenth century AD ; stone image of Uma-Mahesvara of the tenth century AD; stonei mage of Brahma and Vishnu of the tenth century AD and coins of Queen Victoria, Edward VII, George II, Sher Shah Suri and Islam Shah.

51. ARCHAEOLOGICAL MUSEUM, VELHA GOA.—One bronze Siva-head with halo, and twenty-five wood sculptures of the Portuguese times were added to the Museum collection.

52. DISTRICT MUSEUM, VIDISHA.—Considerable improvements were made by using suitable pedestals and lighting arrangements and providing new background. A new gallery for Jaina sculptures was also set up in the Museum.

53. VICTORIA JUBILEE MUSEUM, VIJAYAWADA.—The Buddhist Gallery was set up with the addition of twenty-two sculptures, some photographs of Buddhist sculptures from Dhulikotta and Chandavaram and copies of Ajanta paintings. Out of twenty-two sculptures collected from the Districts of Guntur, Krishna and Khammam, eighteen are of limestone ranging in dates from second century BC to fourth century AD The Gallery was thrown open to the public on 11.4.81.

VIII. ARCHITECTURAL SURVEY OF TEMPLES

NORTHERN REGION.—The Temple Survey Project, Northern Region, of the Survey under R. D. Trivedi continued the survey of early medieval temples in the Guna, Mandsaur, Rewa, Sagar, Satna, Shahdol and Shivpuri Districts of Madhya Pradesh. A few notable temples are" described below in brief.

The hill of Dhamnar in District Mandsaur, which is famous for al arge number of Buddhist caves excavated in the hill, contains a rock-cut temple of Dharmanatha_ (pl. XL A) or Dharmarajesvara standing in the middle of a huge rectangular pit. The temple is surrounded by seven smaller rock-cut shrines. Out of these, there are four shrines located in the four corners of the pit, while the rest are facing the *bhadra-rathikas* of the *garbha-griha.* In plan and elevation the temple contains a *garbha-griha, antarala, mandapa* and *ardha-mandapa.* The *adhishthana* of the temple consists of *khura, kumbha, kalasa* and *kapotika* mouldings, which are without any decoration except the *chaitya-w'mdow* motif carved on the *kapotika.* The *jangha* which has three-pilastered and pedimented *bhadra-rathikas* on each of the three cardinal sides are empty at present. The pedimented niches on the *karnas* represent the figure of *ashta-idikpalas* and those on the *kapili* (wall joining *garbha-griha* with *mandapa)* contain standing images of Ganesa on the south and a female deity on the north. The *sikhara* has a broad *madhya-lata* ('central shoot') carved with *chaitya*-mesh design, flanked by *bala-panjaras* and *karnas,* marked with *kama-malakas* dividing the *sikhara* into six *bhumis.* The *sikhara* has a huge *amalaka* on top. On the eastern side *suka-nasika* is exhibited in the form of three pointed pediments. The roof of the *mandapa* is of *phamsana* type (pent-roof in multiple storeys) with a *ghanta* ('bell') and two small *amalakas* on top. The temple is entered through an *ardha-mandapa,* carved with front pilasters which support the pointed roof. The *mandapa* has four central pillars and a number of pilasters along the side walls. The doorway leading to the *garbha-griha* is carved with the river godesses, Ganga and Yamuna, on the lower part, and is crowned with the figures of Vishnu and Lakshmi at the *lalata-bimba* indicating its original dedication to Vishnu. There is a Siva-*linga* installed in the *garbha-griha* along with a standing image of Vishnu placed on a pedestal against the back wall. The temple, datable to the ninth century AD, is one of the rare rock-cut examples carved with the details of a structural temple.

The temple remains at Tumain (pl. XLI A), Pistrict Guna, are significant as they represent a continuity in the temple-building plans from the Gupta period up to the medieval period. The doorways of the Gupta and early medieval periods may be cited as examples.

Mahuan, District Guna, has a *mandapika* and a pillared *nandi-mandapa* situated at a little distance from each other. The *mandapika* consists of a *garbha-griha* and a *mukha-mandapa* resting on two front pillars and two back pilasters. It is characterized by a low *adhishthana* and simple *jangha* portion, formed with square pilasters. On the upper part, this is decorated with simple double medallions and roofed with two blocks of stone, one over the *garbha-griha* and the other over the *mukha-mandapa* on a slightly lower level. The structure is datable to the seventh century AD and has a similarity with the one located at Mahua, District Shivpuri.

Two temples situated side by side are at Keldhar in District Shivpuri : one of them is badly damaged while the existing one, called Siva temple,, is preserved up to the *jangha.* This temple, devoid of *sikhara,* consists of *garb-griha* and *antarala* inside the doorway. The remains lying at the site indicate that originally it had a *mukha-mandapa* also, which now appears to be missing. Based on *adhishthana,* carved with bold *khura, kumbha, kalasa* and *kapotika* mouldings its *jangha* portion carries pilastered niches under long pediments as is usually found in the temples of the Pratihara period. The upper part of *jangha* bears *ghanta-mala* design. Brahmanical deities Parvati in *panchatapas,* Karttikeya on peacock and four-handed dancing Ganesa decorated the

bhadra niches. The niches on the *karnas* contain the figures of *ashta-dikpalas* in their respective directions. The doorway in five *sakhas* exhibits beautifully the river goddesses Ganga and Yamuna at the base. The flying figure of Garuda, holding a crown at the *lalata-bimba,* also deserves mention. The temple is datable to ninth century AD.

The dilapidated Sun temple at Sesai (pl. XL B), District Shivpuri, comprising a *garbha-griha, antarala* and *mukha-mandapa* rest on two front pillars. Although the temple *sikhara* does not exist now some portions of *jangha* and lower part of *sikhara* give an idea of the temple. It is remarkable for its moulded *adhishthana* decorated with pedimented niches on all the offsets, *jangha* portion with *bhadra-rathikas* preceded by carved pillars on the three cardinal sides, flanked by *anurathas,* simulating pilasters and the *karna-mchzs* exhibiting *ashta-dikapalas* in their respective directions. The back *bhadra-rathika* facing east contains the image of Sun god mounted on his chariot. The *varandika* portion of the temple having three prominent mouldings—two *kapotikas* and a row of decorated rafter ends—supports the remnants of *pancharatha-sikhara.* The *pancha-sakha* doorway is elaborately-carved representing on the *lalata-bimba* the Sun god on a chariot drawn by seven horses, thereby indicating its dedication to the deity.

The Ranamuktesvara temple (pl. XLI B) at Kukarramath, District Mandla, on a restored *jagati* is *pancharatha* in plan and elevation. The temple is dedicated to Siva. It consists of a *garbha-griha* and *antarala* inside the doorway and is in ruin. Multiple *adhishthana* mouldings are decorated with miniature *sikharas* on *bhadra* portions. The *karnas* and *anurathas* have narrow niches with elongated pediments on top. The *jangha* has *bhadra-rathikas* with small door-frames, preceded by decorated pillars. The niches on the *karnas* are carved with the figures of *ashta-dikpalas.* The *jangha* portion over the *karna* niches bears profuse ornamentation, as the *bhadra-rathikas* are embellished with miniature pillars, the latter being surmounted by triple *chhadya,* fluted columns of the *anurathas* and elongated *udgamas* in the *salil-antaras.* The *sikhara* consists of *madhya-lata* flanked by *bala-panjaras* and *karnas* marked with *bhumi-amalakas.* There are two doorways, both badly damaged, the one leading to the *antarala* and the other to the *garbha-griha.* The river goddess Yamuna, mounted on her *vahana* tortoise, is found holding a pitcher in her right hand, and is at the base of left door-jamb leading to the *garbha-griha.*

SOUTHERN REGION.—The Temple Survey Project, Southern Region, under L.K.Sharma assisted by K. K. Ramamurthy continued (*1979-80,* p. 121) the survey of the Western Ganga temples in Mandya and Tumkur Districts of Karnataka. .

The rock-cut and structural remains over the flattish granite hillock called Kanakagiri at Tippuru, (pl. XLII) District Mandya, provide fresh evidence of Digambara Jainism (fig. 19) that rose to the status of a state religion from the time of Ganga king Sivamara II (AD 788-812).

There is a trough formed by deep depression at the south-east of the hill slope, which was bounded by cut-stone masonry blocks, to serve as a deep pond *(kolanu)* for the use of Jaina ascetics. About fourteen standing and seated Jaina Tirthankaras, carved in low relief, occupy the middle height of the rock-cliff and face west. Small square or rectangular niches with the standing or seated Tirthankaras were attempted on the smooth vertical face of the rock eastwards as well. Among the loose images in and around this pond, a seated Suparsvanatha in *dhyana,* protected by a five-hooded snake, appears to be the earliest while the two standing figures of Parasvanatha within the pond, partly under water as also other broken examples of standing Jinas, and *chauri*-bearers in whitish granite appear to be later Ganga or Hoysala in style ranging in date from the eleventh to thirteenth century AD. The remains of a *vihara,* built of brick, were found overhead this pond and perched on the top contours of the flattish hillock. For each unit there is a front porch with *chandra-sila* entrance flanked by *aksha-nidhis* and *chauri*-bearers and a pillared hall with a square shrine chamber at the back. Ground plans of small square rooms forming into an L-shaped unit, were also noticeable. The brick sizes correspond to 30 x 71/2 x 3 cm and wedge-shaped ones are of the size of 23 x 14 1/2 x 17 1/2 cm. Inscriptional evidences attest to the importance of the *basadi* at *Tippeyuru* from the time of Narasimha Ereyappa

(AD 788-95), son of Sivamara II. The brick monastery was constructed in the Saka year 838 (AD 916-17) during the reign of Nitimarga II Permanadi. The *basadis* continue to enjoy royal patronage during the time of the Hoysala king Vishnuvardhana (AD 1117) and were hallowed by the presence of great Kannada literaturs *Kavi* Kandarpadcva Balachandradeva and his wife Lakumadevi.

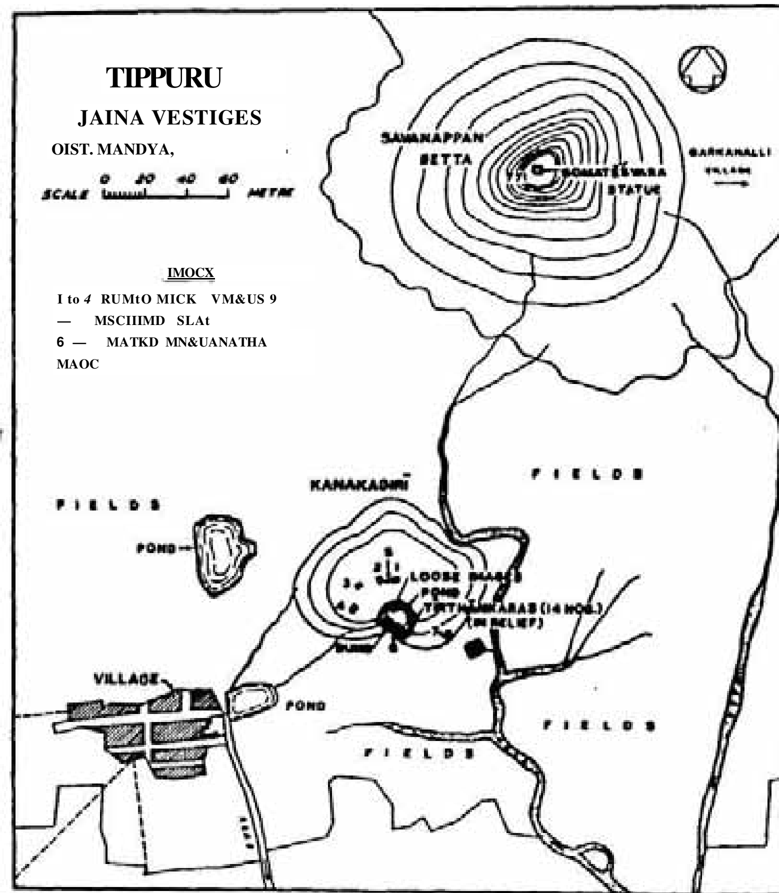


FIG. 19

A higher hill northwards known as Savarappan-betta has on its top a Gomatesvara installed during the post-Hoysala times. There exists an Isvara temple on the tank-bund in a small village called Kulgera, about 4 km south of Tippuru, famous for the record of Nitimarga. Two fine sculptures of Jaina *chauri*-bearersoccur here, and these are said to have been brought from Tippuru. A loose seated figure of *yaksha* Dharanendra bearing an inscription referring to a *basadi* of the time of Nitimarga I (AD 843-870) was found in the premises of a modern Isvara *devasthana* in the village limits between Kamagondanahalli and Pattanayakanahalli.

The BrahmanicaLtemplesJn brick continued to occur till the time of the Ganga king Sripurusha. There are twoda datable examples traced at Honudaki. District Tumkur, and Kodihalli, District-Mandya, respectively with only ground-plans. Explorations at Honudaki (fig72O), well known for a stone inscription of Sripurusha Ereyappa (AD 725-88) from an ancient site called Jalagaradibba, brought to light the ground-plan of a rectangular brick temple of which ten brick courses were revealed in a cut section at the eastern extent of the

mound. The basement reveals an *upana,* a simple *manchaka* type *adhishthana,* a *prati* and a stone slab *pattika* on top. An oval-shaped moulded pedestal, probably for placing the goddess, was also found. The inscribed slab assignable to the beginning of the eighth century alludes to the gift of gold to the goddess called Ponniduke by the king's uncle Sivamara Ereyappa.

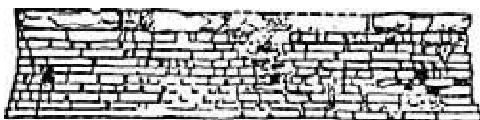
The Dadigesyara temple (fig. 20) at Kodihalli, largely reconstructed with stone slabs, revealed earlier brick foundation consisting of a rectangular shrine of larger dimensions. The

BRICK TEMPLES OF THE GANGAS: KARNATAKA

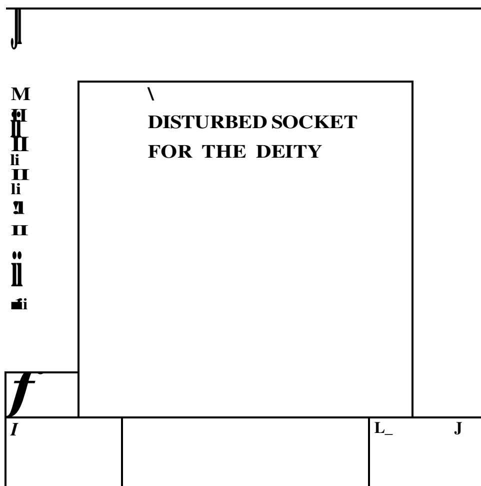
HONNADEVF TEMPLE: HONUDAKI

DIST. TUMKUR

SCALE O METRE i



ADHISHTHANA



PLAN

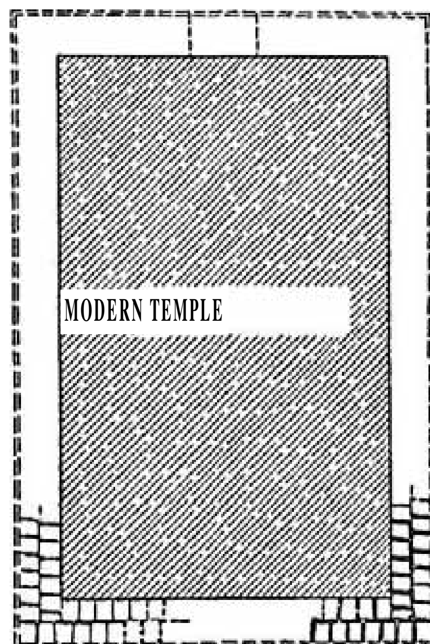
DADIGESVARA TEMPLE: KODIHALLI

DIST. MANDYA

SCALE I O I METRE



'ADHISHTHAN



A

PLAN

FIG. 20

linga and the rectangular moulded *padma-pitha* in the sanctum appear to be original. The *pranala* is covered by the later structure, the earlier *adhishthana* of a simple *tripatta-kumuda* class of moulded bricks being partly traced at the northern side. From the name of the temple, it appears that it was raised perhaps in honour of Dadiga, father of Madhava II (AD 370-90), the founder of the Western Ganga line. The brick size 31 x 24 x 6 and 26 x 16 x 6 cm compare to the ones found at Manne, District Bangalore of the time of Sripurusha *(1977-78,* p. 101).

The Brahmanical temples noted at Bargur, Aralaguppe, Kunigal, and Nonavinakere in District Tumkur, Vaidnathpura, Bundanuru and Kyatanahalli, District Mandya, are a class by themselves and demonstrate full emergence of the native Ganga style.

The Isvara temple at Bargur, bordering the Gangavadi territory, was possibly extended during the time of Ereyappa Nitimarga I (AD 843-70). This temple, as it stands now, has been largely renovated by local Palegars. The inner plan, however, reveals a square *garbha-griha,* an *antarala* passage with pillars, a *maha-mandapa* with a *navaranga* grid and a *mukha-chatushki.* There occurs the *nandi-sala* on sixteen ornate pillars, where a massive Nandi is placed on the central *ankana* viewing the god. The inscribed slab of the time of the Nolamba Mahendra at south-east attests to the elaboration and gifts to the temple. The entrance to the *maha-mandapa* has a *tri-sakha* door-frame, the *kudya-stambhas* with *taranga* corbels held up by the plain *utlaranga* frame. The *jala-vatqyanas* show birds within looped scrolls. The pillars of the *mandapa* are a class by themselves, the lower shaft with elongated *patra-dalas,* the *kirti-mukha* with seated females or *ganas* in its garland loops, the *ghata-pallava* base of the *kumbha,* the cross-corbels with the *taranga* scroll exhibit early Chalukyan and the distinctive Gupta characteristics. The loose images in the *mandapa* include Mahishamardini, four-handed seated Vinadhara, Vaishnavi and a standing four-armed Mahavishnu and bear the stamp of the Ganga physiognomy.

The group of templ (pl. XLIII) Nonavinakere (Gargesvara, Nonabesvara and Santesvara) represents a late phase of the Ganga architecture and has largely undergone renovations on the exteriors. The *sikhara* and *suka-nasi* over the *antarala* were rebuilt during the Palegars period. The *jalis* at the *gudha-mandapa,* the *tri-sakha* door-frame with a cruder *uttaranga* supported by pilasters display the late Ganga-Chalukya style.

The. KellesYara—temple, (pl. XLIII) at Aralaguprje, District Tumkur, is another remarkable example of native Ganga art, influenced by the Chalukya-Nolamba idioms. The temple has a square *garbha-griha,* an *antarala* with *suka-nasi* projection and a richly-sculptured *navaranga* unit. The entrance is characterized by multiple *sakhas* and *dvaramukha-sopana.* The exterior wall reveals a plain *brahma-kanta* pilastered decor, regularly-spaced except at the two central *jalis* which contain the creeper-scroll entwining dancers and riders. The *sikhara* and *suka-nasi* have undergone renovation unlike the *adhishthana* part, which retained its low *upana, padma-jagati, tripatta-kumuda, tula-pitha* and a projecting *pattika* above. The *pranala* is cut through the *kumuda.* The main entrance *door-sakha* is significant. Besides, smaller-seated *nidhis* and *dvara-palas,* flanking the base of the *mala-sakha,* the bold creeper scroll with *ganas* in loops and with the Gaja-lakshmi at the *lalata,* the *uttaranga* above is supported by *kudya-stambhas* which hold, in turn, the stumpy *ganas* and the *kapota-vari* with *chandra-salas.* The *ashta-dikpala* grid characterizing the central *ankana* of the *maha-mandapa* displays at the centre a bodly-sculptured four-armed dancing *natya* Siva with his orchestra, the four rafter-ends of this panel carrying bracket figures of *gandharvas* flying with *malas,* held readily to offer to the great dancer. The depiction of the *dikpalas* is exceptionally natural and elegant and these were shown as if rushing to witness the performance of the master along with their retinue and respective *vahanas.* The representation of Nirruti is unusual as it is shown riding a ram and also the placement of the *dikpalas* differed from the textual descriptions. In front of this unit there appears a *nandi-sala* with three lateral shrines which were added during the Hoysala and the later periods. The smaller shrine, facing the north, houses a unique image of Uma-Mahesvara seated on *manchaka* throne with *padma*-base (ht. 1½ m). The *prabha-mandala* has flying *gandharvas.* The youthful and resplendent figure of the god, his voluminous *jatas,* the graceful and voluptous goddess with a fine *dhammila* hair-do, the rich ornamentation and dress, particularly the pearl *yajno-pavita* extending across the right arm of the god, make this specimen the finest representa-tion *(sukhasinam sahomaya)* in the typical Ganga style blending with the Pallava-Nolamba characteristics. Similarly the *natya* Siva in the *navaranga* ceiling stands as a unique example of the Ganga-Rashtrakuta vintage resembling in depiction the Papanasi temple at Alampur.

At village Vaidvanathpura. six kilometer east of Maddur, an interesting temple was found to Siva. Thev were known from inscriptions as *Sivapura svayambhu-Vaijanath* of *Narasimha Chatur-vedimangalam* located in Kalalenad. It appears that the place enjoyed the

patronage of Sivamara II (AD 788-812), who had the support of the Pallavas and Nolambas. The complex, as it stands today, is to a large extent a Hoysala reconstruction of the time of Vishnuvardhana (AD 1131), and subjected to several later renovations. The *adhishthana* is of the *tripatta-kumuda* class with simple *kapota.* The *vyalavari* rafter, like the Maralesvara temple at Talakad, is partly visible. The *kati* is plain except the terminal pilasters. The *sikhara* and the roof over *maha-mandapa,* along with other minor shrines, were all made of brick. A free-standing pillar, perhaps a *dhvaja-stambha* having fluted circular shaft with *mala-sthana, kalasa,* ribbed *kumbha, tadi* and the tenon left for the capital elements and also a square *balipitha* with *urdhva-*and *adho-padma* mouldings recall Ganga examples of Kambadahalli. The *maha-mandapa* has sixteen pillars while the central *ankana* has a plain ceiling with overhanging lotus pediments; the surrounding aisles have sculptured grids. The ceiling in front of the *antarala* possessed dancing Siva-Parvati and *ashta-dikpalas* mounted on their *vahanas* all around recalling the Alur (Hale) and Begur examples. The *garbha-griha* entrance has *pancha-sakha* doorway, the *kudya-stambhas* holding the *uttaranga* consisting of *kapota* with *kudus* and *gana* frieze at the *valabhi.* Ganga and Yamuna figures flank the *dvara,* as at Begur in District Bangalore.

The sculptures found here include a fourhanded Vaishnavi, Ganesa and lion-based pillars, a seated four-armed Harihara with his *lanchhanas* and they recall early Pallava specimens of Mahabalipuram and Kanchipuram. Similarly, clear Ganga-Chalukya workmanship is reflected in the *navaranga-pillars,* which possessed well-defined *mala-sthanas, padmadala-kattu, kumbha* part with *patra-dala* etching, the *taranga* cross-corbel with median scroll band etc. The four-armed Chamunda, Sarasvati and the eight-armed Mahishamardini are typical examples displaying the bold and expressive Ganga physiognomy influenced by Chalukya-Rashtrakuta idioms.

The Somesvara temple at Kunigal lost its original features due to its total renovation during the Chola-Hoysala periods. The Devi shrine contains some early sculptures such as Vaishnavi and Durga images resembling those from Dodshivara *(1977-78,* p. 102). A four-armed Mahishamardini, now in the Sivaramesvara temple, resembles the late Ganga-Chola examples from Kolar and Talakad.

The Somesvara temple at Budanuru (Hale) and Kodandarama temple, at Kyatanahalli, District Mandya, have preserved their original plinths of the *tripatta-kumuda* class. The entire superstructure is rebuilt in bricks. The temple at Budanuru enjoyed the patronage of Rajendra Chola. The occurrence of several sculptured hero-stones attest to the Chola take-over during the time of Rakkasa Ganga, the last Ganga ruler. At Kyatanahalli a *basti-gadda* once flourished, south of the village, as attested to by an inscribed slab of the time of Nitimarga (AD 907-919).

IX. PRESERVATION OF MONUMENTS

MONUMENTS OF NATIONAL IMPORTANCE

CENTRAL CIRCLE

Madhya Pradesh

1. MAMA-BHANJA-KA-TEMPLE, BASRUR, DISTRICT BASTAR.—For visitors' entry the area around the temple was provided with barbed-wire fencing and angle-iron gate.

2. MAHADEVA TEMPLE, BASTAR, DISTRICT BASTAR.—The *sikhara* of the temple was made watertight and loose missing stones were restored to check seepage of water.

3. DANTESVARI DEVI TEMPLE, DANTEWADA, DISTRICT BASTAR.—For security of the temple welded mesh-door shutters with angle-iron and mild steel-grills for windows have been provided.

4. VISHNU TEMPLE, JANJGIR, DISTRICT BILASPUR.—For preventing seepage of water the *sikhara* has been watertightened. The damaged flagstone flooring of the platform was restored and pointing of the floor completed with toned cement mortar.

5. BHIMA-KICHAKA RUINS, MALHAR, DISTRICT BILASPUR.—In continuation of the last year's work the ruins of the *sikhara* and plinth of an early medieval temple were exposed completely.

6. MAHADEVA TEMPLE, PALI, DISTRICT BILASPUR.—The entire protected area around the temple has been provided with barbed-wire fencing to ensure security.

7. LAKSHMANA TEMPLE, KHAJURAHO, DISTRICT CHHATARPUR.—The plaster and *lakhauri* brickwork from the *sikhara* of the north-eastern subsidiary shrine facing the north (pl. XLIV) was replaced by the cut-stone masonry bearing shallow fret design. Restoration of the porch on the southern side is in progress.

8. WESTERN GROUP OF TEMPLES, KHAJURAHO, DISTRICT CHHATARPUR.—The damaged approach roads to the western group of temples were reconditioned by laying and consolidating a fresh layer of *murum.*

9. SIDDHESVARA TEMPLE, NEMAWAR, DISTRICT DEWAS.—For the protection of sculptures kept in the store and the temple, the entrance doors were provided variously with welded mesh-framed in angle-iron, door-shutters, besides a collapsible door-shutter.

10. BUDDHIST CAVES, BAGH, DISTRICT DHAR.—The weakened and the decayed rock surface on the eastern side of Caves 2 and 4 was sealed and packed with 20-cm thick layer of R.C.C. for the preservation of the cave paintings from dampness and seepage of water.

11. DARYA KHAN'S MOSQUE, MANDU, DISTRICT DHAR.—The damaged concrete floor was replaced by fresh lime-concrete.

12. GADA SHAH'S PALACE, MANDU, DISTRICT DHAR.—The top of the wall was made watertight by laying cement concrete. The debris inside and outside the palace was also removed to expose the original floor surface. Damaged walls were also restored to match the the original ones.

13. HATHI-MAHAL, MANDU, DISTRICT DHAR.—The cavities which developed in the stone pavement were repaired by brick masonry. The dome surface was plastered with lime mortar and the terrace by laying a fresh lime concrete to make it watertight.

14. JAMA-MASJID, MANDU, DISTRICT DHAR.—The missing and damaged stone *jalis* and *chhajjas* have been replaced by new ones. The dome was made watertight by laying a fresh layer of concrete and the facade replastered with lime-mortar.

15. ROYAL PALACES, MANDU, DISTRICT DHAR.—The collapsed arches have been restored. The top of the walls was watertightened to check percolation of water.

16. TAVELI-MAHAL, MANDU, DISTRICT DHAR.—A fresh layer of lime concrete was laid on the decayed floor of the basement.

17. MAHADEVA TEMPLE, DEOBALODA, DISTRICT DURG.—The remains of the original compound wall around the temple were exposed and a barbed-wire fencing on angle-iron posts was provided all around to ensure security.

18. SITA DEVI TEMPLE, DEORBIJA, DISTRICT DURG.—In continuation of the last year's work (*1979-80,* p. 126) of the fencing, the compound wall of the coursed rubble stone masonry has been completed.

19. MAHADEVA TEMPLE, ASIRGARH FORT, DISTRICT EAST NIMAR.—The restoration work of collapsed and overhanging portion of the random rubble masonry wall inside the *baoli* was completed to protect the structure from further damage.

20. MOSQUE, ASIRGARH, DISTRICT EAST NIMAR.—Fresh lime plaster mixed with cement has been applied after removing the dead lime-plaster from the roof to make it watertight.

21. BIBI SAHIB'S MASJID AND COMPOUND, BURHANPUR, DISTRICT EAST NIMAR.—In order to check the percolation of water, the dead lime plaster from the surface of domes was removed and 40-mm thick fresh lime-plaster applied.

22. HAMAM-KHANA, COWK MOHALLA, BURHANPUR, DISTRICT EAST NIMAR.—In continuation of the last year's work (*1979-80,* p. 126) the removal of debris from inside the apartments was completed.

23. TOMB OF NADIR SHAH, BURHANPUR, DISTRICT EAST NIMAR.—The cut-stone facade, which was damaged and rendered out-of-plumb due to thick vegetational growth, was replaced by new ones after removing the vegetation. The compound wall was also raised in rubble masonry.

24. KOSHAK-MAHAL, CHANDERI, DISTRICT GUNA.—In continuation of the last year's work (*1979-80,* p. 126) the bulged-out and overhanging stones of the walls have been reset to their original position and duly fastened with copper clamps.

25. OLD FORT, CHANDERI, DISTRICT GUNA.—The thick and deep-rooted plants and other vegetational growth in the premises and fortification walls of the fort was cleared.

26. SHAHZADI-KA-ROZA, CHANDERI, DISTRICT GUNA.—The protected area was enclosed by a wall of course rubble stone masonry.

27. CHAUSATH YOGINI TEMPLE, BHERAGHAT, DISTRICT JABALPUR.—The protected area around the temple has been enclosed with barbed-wire fencing. Pipe-railing on girder posts has been provided on both sides with a rail in between to make room for one-way traffic.

28. GAURISANKARA TEMPLE, BHERAGHAT, DISTRICT JABALPUR.—In continuation of the last year's work *(1979-80,* p. 127) the lime plaster was removed for exposing the original surface. Now a fresh lime concrete floor has been provided.

29. SOMNATHA TEMPLE, BURGAON, DISTRICT JABALPUR.—Concealed girders have been fixed to support the damaged lintel. The pointing of the stone flooring of the platform in cement mortar was completed.

30. BRAHMANICAL TEMPLES, DHAMNER, DISTRICT MANDSAUR.—The work of providing concealed girders, which started last year *(1979-80,* p. 127) for the cracked rock-cut lintels of the *mandapa,* has now been completed.

31. BUDDHIST CAVES, DHAMNER, DISTRICT MANDSAUR.—In continuation of the last year's work *(1979-80,* p. 127) the pulverized roof of the remaining caves was made watertight by lying 10-cm layer of cement-*surkhi* concrete and finished with a layer of concrete composed of cement, *surkhi* and pebbles to match with the original rock surface.

32. GADHI, PADHAVALI, DISTRICT MORENA.—The work of removing the debris to expose the buried medieval structures is in progress.

33. BHAND-DEVAL, ARANG, DISTRICT RAIPUR.—In continuation of the last year's work *(1979-80,* p. 127) door-shutters with mesh have been provided in the entrance doors.

34. FORT, RAISEN, DISTRICT RAISEN.—The deteriorated, worn-out and sunken approach road from village to Nazafat gate was raised *(1979-80,* p. 127) and missing stones replaced to provide easy access to the fort.

35. BARADARI COMPLEX, FORT, DISTRICT RAISEN.—The repairs to the compound wall which was started in *(1979-80,* p. 127) in C. R. masonry has been completed. The dead lime-plaster has also been replaced by fresh lime-plaster.

36. FORT, GARHPEHRA, DISTRICT SAGAR.—The stones of broken *chhqjjas* were replaced by new ones and R.C.C. lintel was provided in place of broken stone lintel. Parapet wall was replastered with lime plaster.

37. SIVA TEMPLE, BHUMRA, DISTRICT SATNA.—The collapsed *jagati*-terrace on the southern side was rebuilt in cut-stone ashlar masonry.

38. VIRATH TEMPLE, SOHAGPUR, DISTRICT SHAHDLOL.—Pulverized and dead concrete of the platform around the temple was replaced with fresh cement-concrete. The stone apron

was also provided around the temple to check the percolation of water into the foundation. Angle-iron doors were provided at the entrances and niches.

39. MONASTERY, RONOD, DISTRICT SHIVPURI.—The bulged portion of wall was repaired in cut-stone ashlar masonry in 1:4 cement-mortar.

40. MONASTERY, CHANDREHI, DISTRICT SIDHI.—The bulged portions of the walls of the cells have been redone in cut-stone ashlar masonry after removing the thick vegetation.

41. SIVA TEMPLE, CHANDREHI, DISTRICT SIDHI.—The damaged and missing flagstones of the flooring were replaced. The pointing was also completed in 1:3 cement-mortar. In the sanctum an expanded metal door was fitted.

42. BAJRA-MATH, GYARASPUR, DISTRICT VIDISHA.—The protected area around the monument was fenced with barbed-wire.

43. BUDDHIST STUPA, GYARASPUR, DISTRICT VIDISHA.—The work of repairing the fallen portion (pl. XLV) of stupa in C. R. masonry in lime-mortar is in progress.

44. CAVES, UDAYAGIRI, DISTRICT VIDISHA.—The sunken state of the portico over the Varaha image in Cave 5 has been clamped with R.C.C. beam, and the entire portico was finished with cement plaster and cement painting to match with the original rock colour. A layer of lime-concrete was applied on the roof of the portico to make it watertight as also to ensure proper flow of water.

45. GUPTA TEMPLE, UDAYAGIRI, DISTRICT VIDISHA.—The bulged portion of *jagati* has been reset in cut-stone ashlar masonry in lime mortar and wall-top duly watertightened.

DELHI CIRCLE

Delhi

46. ADILABAD FORT, DELHI.—The repairs to the wall (pl. XLVII) on original lines with lime concrete mortar is in progress.

47. ARAB-KI-SARAI, DELHI.—The work of face-lifting of the monument has been completed.

48. BARADARI, HUMAYUN'S TOMB, DELHI.—Fresh lime concrete mortar was inserted after stripping the decayed and pulverized mortar. The damaged and disintegrated stucco ceiling was stabilized; the original designs were also reproduced. The work of stitching and toothing the wall arches is in progress.

49. BADEKHAN AND CHHOTE KHAN'S TOMB, DELHI.—The decayed, missing red sandstone *chhajjas,* base pillars, lintels, pillars of *chhatris* (pl. XLVI) and the intrados of the dome and wall were replastered. Wide cracks in the dome and wall have been grouted. Besides, the setting of loose ornamental plaster and the filleting of the Arabic inscriptions have also been undertaken.

50. BEGUMPURI MOSQUE, DELHI.—The protected area after demarcation was enclosed with random rubble masonry wall and M. S. grill.

51. BIJAY-MANDAL, DELHI.—The damarcated protected area was enclosed with a wall in random rubble masonry M. S. grill.

52. CHAUBURJA MOSQUE, DELHI.—The damaged and bulged-out parts of the masonry had been removed and stones reset.

53. CHAUSATH KHAMBHA, DELHI.—The marble graves were cleaned after removing the debris and vegetation. The floor-joints were also pointed.

54. GHIYASUDDIN BALBAN'S TOMB, DELHI.—Some medieval structures along with ceramics and antiquities were discovered while clearing the debris.

55. HUMAYUN'S TOMB, DELHI.—The sunken and damaged cut-stone pavement of the second terrace was conserved retaining the original design and old stones.

56. INDIAN WAR MEMORIAL MUSEUM, RED FORT, DELHI.—The walls, doors and windows were painted.

57. JAMA-MASJID, DELHI.—New red sandstone *chhajjas,* including veneer, were fixed and damaged columns repaired.

58. KOTLA FIROZ SHAH, DELHI.—The vegetation over the eastern wall was removed.

59. MOHAMMADI MOSQUE, DELHI.—The reconstruction of the fallen and bulged-out wall built in rubble masonry, the restoration of ashlar work on the gateway and the stucco work of *kanguras* were executed. Its roof was rendered watertight by laying fresh lime-concrete.

60. NAUBAT-KHANA, RED FORT, DELHI.—The joints of the red sandstone floor were filled in.

61. PEER GAIB, KASHMIRI GATE, DELHI.—Lightening conductors were provided for the safety to the structure.

62. PURANA QILA, DELHI.—The gaps in the fortification wall were underpinned with stone masonry and the joints pointed with mortar. In the inner cells the work of random rubble stone masonry and pointing of joints with lime cement mortar was carried out.

63. QUDSIA GATE, DELHI.—The cut and moulded *lakhauri* bricks of the masonry were restored. The undercuts of masonry were underpinned and the collapsed parts restored as per the original.

64. QUTB-MINAR, DELHI.—The bulged-out structures were exposed and reset.

65. RANG-MAHAL, RED FORT, DELHI.—The inlay work with semiprecious stones in the foundation was executed.

66. SHISH BURJ, RED FORT, DELHI.—The work of random rubble masonry with sandstones, underpinning fallen portions, pointing joints and resetting bulged out portions were executed.

67. SIRI FORT, DELHI.—Buried parts of the fort wall were exposed and stabilized. The masonry of the fortification wall adjoining the bastion was restored.

68. TUGHLAQABAD, DELHI.—Bulged-out and hanging portions of the wall were reset with random rubble masonry in lime-concrete mortar.

Rajasthan

69. FORT WALL, BHARATPUR FORT, DISTRICT BHARATPUR.—After removing the thorny bushes and other wild vegetation growth, the cavities in the rubble masonry wall were underpinned.

70. JAWAHAR-BURJ, BHARATPUR FORT, DISTRICT BHARATPUR.—The sunken sandstone flooring and the collapsed portions of the masonry wall were reset and restored as per the original.

71. OLD RECORD ROOMS, BHARATPUR FORT, BHARATPUR.—The decayed stone slabs of the terrace were removed. The damaged floors were repaved with lime-cement concrete mortar.

72. SAWAN-BHADON, DEEG, DISTRICT BHARATPUR.—Stone railing and *jalis* were fixed and plastered.

EASTERN CIRCLE

West Bengal

73. TOMB OF AZIMUNESA BEGUM, MOHIMAPUR, DISTRICT MURSHIDABAD.—The damaged arched roof has been reconstructed with lime-*surkhi* mortar.

Orissa

74. LORD JAGANNATH TEMPLE, PURI, DISTRICT PURL—After careful removal of the dead lime-plaster the work of grouting of the *mandapa* has been carried out to the wide joints and cracks of the pillars. The work of deplastering and strengthening of the inner structure is in progress on the southern side of the *deul.*

MID-EASTERN CIRCLE

Bihar

75. VIKRAMASILA MONASTERY AND STUPA, ANTICHAK, DISTRICT BHAGALPUR.--The brick masonry of the underground Cell 1, south of the main stupa, was conserved in lime-*surkhi* mortar applied with lime-concrete layer on the top.

The area is being fenced with barbed-wire and the embedding of angle-iron posts in cement concrete is in progress. For discharge of rain water from the monastic complex, the removal of earth is being carried out in the north-eastern side.

76. TOMB OF MALIK IBRAHIM BAYYUR, BIHAR SHAREEF, DISTRICT NALANDA.—The platform around the tomb is provided with fresh lime-concrete after dismantling the decayed one.

77. EXCAVATED REMAINS, NALANDA, DISTRICT NALANDA.—Structures (pi. XLVIII) were reset with dressed brick in lime-*surkhi* mortar and rendered watertight by recess-pointing. The work on the south-eastern tower of the Temple 3 is in progress, while the votive stupas in north-west of the Temple 3 and in the west of the Monastery I has been completed.

78. ANCIENT CITY WALLS OF RAJGRIHA, RAJGIR, DISTRICT NALANDA.— The work of resetting of the dislodged portion of the bastion of the old fort wall, running on the Vipulagiri and Udayagiri hills, overlooking Banganga, in lime-*surkhi* mortar was resumed and completed.

The structural remains of Jivakamravana enclosed by walls built in random rubble were reset in lime-*surkhi* mortar and finished with recess-pointing.

The area near Virayatana is being fenced with barbed wire. The embedding of angle-iron posts is in progress.

79. JAMI MASJID, HADAF, DISTRICT SANTHAL PARGANA.—The dilapidated walls of the ablution tank in the foreground were repaired with brick masonry. The floor and the apron of the tank together with the steps were provided with lime concrete.

80. STUPA REMAINS, CHAKRAMDAS, DISTRICT VAISHALI.—The structures were reset in lime-*surkhi* mortar. The mud walls were protected with lime-concrete shell.

81. ASOKAN COLUMN, KOLUHA, DISTRICT VAISHALI.—The ancient votive stupas excavated in the north of the column, were reset and rendered watertight in lime-*surkhi* mortar.

82. ASOKAN COLUMN, RAMPURVA, DISTRICT WEST CHAMPARAN.—The column is provided with R.C.C. shed to protect the inscription from weather effects.

Uttar Pradesh

83. KHUSRAU'S TOMB, ALLAHABAD, DISTRICT ALLAHABAD.—The border flagstones of the dilapidated platform around the tomb were reset in cement-lime mortar. The sides were plastered in *lime-surkhi* mortar. Besides, the openings inside the tomb were covered with expanded metal fixed in angle-iron frame.

84. KHUSRAU'S SISTER'S TOMB, ALLAHABAD, DISTRICT ALLAHABAD.—The work of removing the decayed plaster and providing fresh *lime-surkhi* mortar was resumed over the wall.

85. EASTERN ENCLOSURE WALL, KHUSRAU BAGH, DISTRICT ALLAHABAD.—The work of raking out decayed mortar from the masonry joints and pointing the same with fresh mortar was resumed over the inner and outer facades.

86. EXCAVATED REMAINS, KAUSAMBI, DISTRICT ALLAHABAD.—The upper brick courses of the ancient monastic remains, near the Asokan pillar, were removed carefully and reset in lime-*surkhi* mortar finished with recess-pointing.

87. GARHWA FORT, SHANKAR-GARH, DISTRICT ALLAHABAD.—The work of removing the accummulated debris was resumed to relieve the structural remains from the excessive load. Besides, the dilapidated remains of the palace-complex are being set in cement-lime mortar and rendered watertight.

88. NEELKANTH TEMPLE, KALINJAR FORT, DISTRICT BANDA.—To divert the rain water falling on the colossal image and also for its easy flow, a rock drain was provided on the escarpment and the uneven depressions were toned with cement concrete.

89. RAJA MANSINGH'S PALACE, KALINJAR FORT, DISTRICT BANDA.—Repairs to the palace were resumed in continuation of previous year's (*1979-80,* p. 131) work and the loose sculptures housed properly for safety.

90. BUDDHIST REMAINS, KUSHINAGAR, DISTRICT DEORIA.—The remains of the monastery G were relieved of the accumulated loose earth overlying it. The upper two to three courses were reset in lime-*surkhi* mortar and finished with recessed pointing. A brick pathway has also been provided in the north-east of the Nirvana temple.

91. NIRVANA STUPA, KUSHINAGAR, DISTRICT DEORIA.—The restoration of the Nirvana stupa, which started last year, is in progress. The brick masonry work in the superstructure was also started.

92. RAMABHAR STUPA, KUSHINAGAR, DISTRICT DEORIA.—The upper brick courses of the structural remains of the stupa in the north-east were removed, reset carefully in lime-*surkhi* mortar and finished with recessed pointing.

93. SHUJA-UD-DAULA'S TOMB, GULAB BARI, DISTRICT FAIZABAD.—The doors and windows of the Imambara in the premises of the above tomb have been painted with synthetic enamel paint.

94. HAMMAM, JAUNPUR FORT, DISTRICT JAUNPUR.—After removing the decayed lime-concrete from the sunken floor of the Hammam chambers, fresh lime-concrete was provided The expanded metal-*jali* was painted with synthetic enamel paint to prevent rusting.

95. BUDDHIST SITE, SARNATH, DISTRICT VARANASI.—The upper brick courses of the structural remains, to the north of the Dhamek stupa, and north-west of the Asokan column were carefully removed and reset in lime-*surkhi* mortar finished with recessed pointing to render the surface watertight. The sub-strata underlying the remains was also protected with toned lime-concrete shell to prevent crumbling of the structure above.

The worn-out pathways in the north and north-west of the site were reconditioned by lime-concrete after dismantling the decayed lime-concrete.

96. DHARARA MOSQUE, VARANASI, DISTRICT VARANASI.—In continuation of the previous year's work (*1978-79,* p. 132) the cracks in the inner arch of the dome, supporting walls and niches, were grouted with liquid cement mortar, and surface neatly finished. Glass tell-tales were fixed to watch momentum, if any. The missing face-stones were fixed in the facade of the mosque matching the original. The damaged pinnacle and the decayed wooden door at the the main entrance of the mosque were replaced with new ones.

MID-SOUTHERN CIRCLE

Karnataka

97. ANANTASAYANA TEMPLE, ANANTASAYANA GUDI, DISTRICT BELLARY.—The work of replacing the broken beams and slabs with matching ones is in progress.

98. GANAGITTI JAINA TEMPLE, KAMALAPURAM, DISTRICT BELLARY.—Broken heavy beams and roof slabs of the front *mandapa* were replaced with new ones. Doors made after the Vijaynagara style were fixed to the two entrances of the temple.

99. PATTABHIRAMA TEMPLE, KAMALAPURAM, DISTRICT BELLARY.—The roof has been watertightened by brick masonry in lime-cement mortar above stone slab placing a layer of brick-jelley-concrete above it and finished with plaster coat.

100. GROUP OF JAINA TEMPLES, HEMAKUTA HILL, HAMPI, DISTRICT BELLARY.—Two temples of the Jaina group were provided with Vijayanagara temple-type doors.

101. KADALEKALU GANESA TEMPLE, HAMPI, DISTRICT BELLARY.—Door-shutters with welded-mesh were provided to the main entrance. The *mukha-mandapa* of the temple was provided with flagstone pavement in conformity with the original.

102. ACHUTARAYA TEMPLE, VENKATAPURAM, DISTRICT BELLARY.—The work of re-erection of leaning pillars with capitals is in progress.

103. PANCHALINGADEVA TEMPLE, HUBLI, DISTRICT BELGAUM.—Roof-slabs were provided to the masonry gaps.

104. CHIKKIGUDI, AIHOLE, DISTRICT BIJAPUR.—The underground drainage has been provided.

105. GALAGANATHA GROUP OF TEMPLES, AIHOLE, DISTRICT BIJAPUR.—Temples 4 and 7, which were badly sunk and gone out of plumb, were dismantled from roof to foundation and reset in their original position after strengthening the foundation with cement-concrete.

106. ALI SAHAHID PIR'S MASJID, BIJAPUR, DISTRICT BIJAPUR.—The protected area has been fenced with barbed-wire and face-lifting operations undertaken.

107. ASAR-MAHAL, BIJAPUR, DISTRICT BIJAPUR.—Fallen portion of the southern gate was reconstructed with matching lime-mortar.

108. IBRAHIM-ROUZA, BIJAPUR, DISTRICT BIJAPUR.—The roof was made watertight after resetting the fallen roof slabs in cement-mortar.

109. MECCA-MASJID, BIJAPUR, DISTRICT BIJAPUR.—Top of the exposed wall was pointed and watertightened.

110. SATMANZIL, BIJAPUR, DISTRICT BIJAPUR.—The area has been fenced with barbed-wire.

111. SHAHPUR GATE, BIJAPUR, DISTRICT BIJAPUR.—The broken beam of the gateway was strengthened by introducing concealed I-section girder into the beam. The work of water tightening the stone masonry above the gate by way of pointing in combination mortar was taken up and toned to match with the original. The works of laying the flooring and watertightening the roof are in progress.

112. MAIN WATER PAVILION, KUMATGI, DISTRICT BIJAPUR.—The protected area around the monument has been fenced with barbed-wire.

113. VIRABHADESVARA TEMPLE, CHAUDADANPUR, DISTRICT DHARWAR.—The Work of erecting fallen stone pillars of the *mukha-mandapa* of the temple has been completed. The work of providing roof-slab and laying of concrete over them to render the *mandapa* watertight is being taken up.

114. LAKSHMIDEVI TEMPLE, DODDAGADDAVALLI, DISTRICT HASSAN.—Cracked beam in the *navaranga* has been strengthened by inserting I-section girder. Dislodged flight of steps at the entrance had been reset and door shutters provided.

115. LAKSHMINARASIMHA TEMPLE, NUGGEHALLI, DISTRICT HASSAN.—The leaking roof of of the *vimana* has been watertightened after removing dead concrete.

116. AKKANA BASTI, SRAVANABELAGOLA, DISTRICT HASSAN.—Roof over the *navaranga* was watertightened and surface plastered with combination mortar.

The stone support from the back side of the inscribed slab in the courtyard was removed after providing brass dowles for strengthening the cracked portion. The accretionary lime coats from the door-jambs and lintels were removed and the carvings and new inscriptions exposed. Stone pavement in the form of an apron has been laid around the Basti.

117. CHAMUNDARAYA BASTI, SRAVANABELAGOLA, DISTRICT HASSAN.—The joints in the *vimana* and the parapet wall were grouted with cement mortar. The accretionary lime-wash from the ornamental doorway was removed. The side balustrades of the approach flight of steps were readjusted to widen the approach to the temple. The flight of steps which was missing had been provided according to the original. The wooden doors of Basti were painted.

118. CHANDRAGUPTA BASTI, SRAVANABELAGOLA, DISTRICT HASSAN.—The accretionary layers of brick-jelly concrete laid previously as a weathering and watertightening course above the terrace of the Basti were removed and replastered in combination mortar to make it watertight.

119. KATTALE BASTI, SRAVANABELAGOLA, DISTRICT HASSAN.—The walls of circumambulatory path were plastered with combination mortar after thorough cleaning of the old and decayed plaster. The damaged side wall in the *garbha-griha* has been provided with veneer and plastered with combination mortar. The broken slabs at the four corners of the terrace of the path were replaced after removing the broken ones. The accretionary constructions around the *pitha* of the image were removed.

120. MEGALA BASTI, SRAVANABELAGOLA, DISTRICT HASSAN.—The terrace in front of the Basti and the circumambulatory path were relieved of the pulverized earthen tiles and the dead mortar underneath provided with a layer of tiles laid over base cement mortar to render the roof watertight. The accretionary walls were removed to expose the original features of the pillared facade of this Basti.

121. PARSVANATHA BASTI, SRAVANABELAGOLA, DISTRICT HASSAN.—The stone-slab flooring around the *mana-stamba* in front of the Basti was relaid.

The stucco figures in the niche over the entrance gateway of the Chandragiri hill were strengthened by modelling and filleting.

122. GOMATESVARA STATUE, SRAVANABELAGOLA, DISTRICT HASSAN.—The broken and damaged slabs covering the drain around *padma-pitha* of the statue were replaced with matching dressed slabs.

For strengthening the *prakara* wall the wide joints of the veneer stones were grouted and filled with suitably-toned mortar and finished to match the original stone surface.

Partially-mutilated and deteriorated stucco figures in the niches of the parapet over the cloister in front of the Gomatesvara statue were strengthened by filletting, grouting and modelling after removing the thick lime-wash.

The original ornamental features of the pillars and walls of the cloister around the Gomatesvara statue were exposed by removing thick layer of lime coat by careful application of suitable chemicals and thorough washing.

Broken roof-slabs of the *mandapa* in front of the Gomatesvara statue were replaced by new ones and the roof watertightened.

The sunken stone flooring of the enclosed *pradakshina-patha* of the cloister where the images of the twenty-four Thirthankaras are enshrined was reset.

The dead lime-plaster and the pulverized terracotta tiles from the terrace of the *mandapa* behind the statue were removed. Roof-terrace (pl. XLIX) is being made watertight by relaying flat tiles over a bed of lime-cement mortar. That work is in progress.

The parapet wall was replastered after removing the dead and deteriorated plaster.

Besides reconditioning the existing lightening conductors, two new ones were provided for safety of the monolithic statue.

The side gaps in the flight of steps from the *maha-dvara* of the Gomatesvara statue down to Thyagada pillars were filled with mortar.

The terrace of the Akhanda Bagilu (pl. L) was rendered watertight and damaged masonry merlons replastered. The stone flooring on either side of the *mandapa* was reset.

The leaning Thygada Brahma pillar supporting the Brahma image was put back in plumb without damaging the stucco ornamentation on the facade and the broken slabs were replaced. The stone flooring around the pillar was relaid.

Both sides of the gateway of the fort providing access into the top of Vindhyagiri were repaired by filling the wide joints of the stone masonry.

123. LAKSHMINARAYANA TEMPLE, HOSAHOLALU, DISTRICT MANDYA.—Dislodged members of the plinth platform were reset.

124. ANCIENT PALACE SITE, SRIRANGAPATNA, DISTRICT MANDYA.—The protected area of the palace site has been fenced with barbed-wire. Two turn-style gates were also provided.

125. SRI RANGANATHASVAMI TEMPLE, SRIRANGAPATNA, DISTRICT MANDYA.—Stone pavement has been laid around the Jeeyar Sannidhi and Deshikar Sannidhi.

126. NAMBI NARAYANA TEMPLE, TONNUR, DISTRICT MANDYA.—The adjacent sides of the *maha-dvara* of the temple have been provided with stone slab flooring to drain out rain water.

127. KESAVA TEMPLE, SOMANATHAPUR, DISTRICT MYSORE.—The cracked lintels and ornamental *chhajja* in the corridor have been removed after dismantling the terrace and replaced with new stone lintels and *chhajja.* The terrace was also watertightened.

128. TRIMURTINARAYANA TEMPLE, BANDALIKE, DISTRICT SHIMOGA.—The loose mud core filling in between the veneer stones of the *garbha-griha* was removed after carefully dismantling the out-of-plumb veneer stones and the core refilled with rubble in cement-mortar. Three out-of-plumb niches were reconditioned as per the original.

NORTHERN CIRCLE

Uttar Pradesh

129. FORT, AGRA, DISTRICT AGRA.—The red sandstone facade on the western side, brackets and ceiling of *chhajjas* of Diwan-i-Am bearing ornamental designs have been replastered with special matching lime-plaster on walls, built of *lakhauri* bricks. The floor of the *dalans* has been recessed, pointed and plastered at the south, east and west sides.

The *lakhauri*-brick walls of Mina-bazar have been underpinned and pointed after the removal of the vegetation.

Missing and decayed ornamental and floral designs of the plaster of the southern wall and ceiling of the southern room have been restored with special lime mortar matching the original; convex-glass mirrors have also been fixed in the design work.

130. JAMA-MASJID, AGRA, DISTRICT AGRA.—Decayed and missing stone flooring of prayer hall of the south-west corner and *chhajjas* at the north side have been partly restored. The work is still in progress. Small *chhatris* on the top of parapet at the west side have been repaired with new stone *chhajjas* and inlay work of the facade of *chhajjas* has also been pointed. Broken and missing drain covers in the courtyard have been replaced with new stones. The parapet walls have been plastered and cracks of the roof watertightened.

131. RAMBAGH, AGRA, DISTRICT AGRA.—The arches and pillars of the gateways and *katra* have been underpinned and pointed.

132. TAJ MAHAL, AGRA, DISTRICT AGRA.—The loose inlay pieces from the neck of the main dome were taken out and reset after removing the vegetation. Open joints of marble stones of the drum of the main dome were pointed with special lime mortar.

New marble stones were dressed and prepared for *chhajja* and railing of the south-west *minar.*

The Mughal style doors were provided to the rooms below the upper marble platform. Fallen portion of *lakhauri* brick masonry of the walls and compound wall of Khan-i-Alam nursary on the northern side were underpinned. Open joints of the walls have been watertightened.

Wooden railings were provided around the plan of pinnacle in front of the *mehman-khana.*

The loose inlay pieces of white marble were taken out from the back side wall of the north-west *Burj* for resetting; open joints were also pointed.

The bulged marble stones of the dome of *Saheli burj* were reset and open joint pointed with special lime mortar. The decayed stone flooring of the verandah around the tomb was replaced with new stones. The salt-affected and decayed stones of the mouldings were also replaced with new ones. The lime plaster on the north and south side compound walls were removed and replastered after underpinning the fallen portions of the brick wall. The loose stones of the pathways around the tank were reset and pointed.

133. MONUMENTS, FATEHPUR SIKRI, DISTRICT AGRA.—Pointing and resetting were done to the dislodged stones of the causeways of Anup-talao.

The decayed and exfoliated inlay of the north jamb of the Buland *Darwaza* was replaced by duly-grooved new stone and fitted with matching marble pieces.

The drain-covers of the Saikh Salim Chisti's *Dargah* were replaced with new stones.

The fallen ornamental bracket of the pillar was restored while dislodged brackets in the Diwan-i-Khas were reset. A missing pendant of a bracket was recast with cement. The open lower courtyard at the east side was restored.

The decayed plaster of the guard rooms and the wall at the main entrance of the Jodha Bai's palace were replastered. The broken stone *jali* of the balcony and missing pendant of a niche in the porch were replastered with missing ones. The ceiling and the floor of the porch were pointed with cement mortar after chiselling the exfoliated stones. The courtyard around the Tulsi-*chabutra* was pointed after resetting the dislodged flagstone of the floor. The steps leading to the first floor from the pavilion on the south side were restored. The missing *chhajjas* of Khwabgah were replaced. Moss and lichen in the surrounding area had been cleaned.

Wide and deep joints in stone ceiling, walls and brackets of the *madrasa* were pointed. Missing stones of the *chhajja* were replaced.

In the Panch Mahal, missing *chhajja*-stones were replaced.

Inner pathways in the Diwan-i-Am complex were provided with red *morum.* The quadrangle ceiling was pointed and decayed plaster of the *dalan* repaired.

134. HUMAYUN MASJID, KACHPURA, DISTRICT AGRA.—The restoration of the compound wall was done with *lakhauri* brick and lime concrete after removal of the unwanted earth from the foundation. Barbed-wire fencing was provided to the north and west sides of the compound wall.

135. IDGAH, KATGHARA, DISTRICT AGRA.—Inner and outer portions of the compound wall on the east, south and north were underpinned with *lakhauri* brick and recessed-pointed. The central water tank has been plastered.

136. AKBAR'S TOMB, SIKANDRA, DISTRICT AGRA.—The outer face of the *chhatri* on the south-west corner of the compound wall was restored with random rubble masonry and *lakhauri* bricks. Vertical cracks were also filled in.

137. BADRINATH TEMPLE, DWARAHAT, DISTRICT ALMORA.—Flagstone flooring was provided with concrete base for giving the proper slope to drain out water from the temple premises.

138. GROUP OF TEMPLES, JAGESHWAR, DISTRICT ALMORA.—The retaining wall was extended up to the required height on the south side, facing the river Jata Ganga.

139. SUN TEMPLE, KATARMAL, DISTRICT ALMORA.—The collapsed sub-shrine on the south side of the main temple was restored.

140. PATHARGARH FORT, NAJIBABAD, DISTRICT BIJNOR.—Work on restoring the collapsed and dilapidated stone masonry on the south-east corner of the western wall of the fort is in progress.

141. JARAI-KA-MATH, BARWA SAGAR, DISTRICT JHANSI.—Missing portion around the *mandapa* of the temple was provided with lime-concrete base and watertightened.

142. MEMORIAL CEMETERY, JHANSI, DISTRICT JHANSI.—Walls around the cemetery at the north-west corner have been constructed with *lakhauri*-brick and mouldings were plastered. The old walls at the south-east and south-west corners were restored with plaster, som part of compound wall on the western side being pointed and watertightened. The walls of the well and tank have been repaired with *lakhauri* bricks and plastered.

143. MONUMENT OF MAJOR F.W. FINKNEY, JHANSI, DISTRICT JHANSI.—The missing stones from the base of the monument were replaced by new matching stones. The entire structure had been pointed and watertightened.

144. RAJA GANGADHAR RAO'S CHHATRI, JHANSI, DISTRICT JHANSI.—The missing *burj* of the north-west corner has been restored with *lakhauri* bricks up to the level of the compound wall including the stone *chhajjas.*

145. RANI LAKSHMI BAI PALACE, JHANSI, DISTRICT JHANSI.—The terrace on the southern and the northern sides has been plastered and watertightened.

146. BELMORI TEMPLE, CHANDPUR, DISTRICT LALITPUR.—The missing pillars and beams of the *mandapa* of the temple were restored with moulded designs.

147. JHAMMAR TEMPLE, CHANDPUR, DISTRICT LALITPUR.—The unwanted earth and debris were removed from the plinth of the temple and the stones were properly reset in the plinth. The dislodged stones of the temple and the *mandapa* were also reset, while the entire structure was pointed and watertightened.

148. GUPTA TEMPLE, DEOGARH, DISTRICT LALITPUR.—The compound wall around the temple and sculpture-shed has been repaired and plastered.

149. JAINA TEMPLES, DUDHAI, DISTRICT LALITPUR.—The walls of the eastern side of the Jaina temple, damaged due to heavy rains, were rebuilt in the original form up to the height of the main image. The roof of the temple was provided with stone slabs for the protection of the main image; small images on the walls have also been refixed.

150. SUN TEMPLE, DUDHAI, DISTRICT LALITPUR.—The architectural fragments of the temple have been collected around the temple for restoration work.

151. FORT, TALBEHAT, DISTRICT LALITPUR.—Missing part of the wall made of *lakhauri* bricks on the north side of the *baoli* has been reconstructed for the safety of visitors. The damaged *tulsi-chabutra* in front of Man Singh temple was repaired with plaster.

152. AMJAD ALI SHAH'S MAUSOLEUM, LUCKNOW, DISTRICT LUCKNOW.—Ornamental and floral designs of the richly-carved northern facade of the first gateway have been restored with lime cement mortar. The collapsed miniature domes with carvings and mouldings in *lakhauri* bricks on the northern and the southern sides have been set right. The missing stones with *chhajja* facing the north have been restored with lime mortar. The dead concrete from the roof on the east was removed and replaced by fresh concrete.

153. IMAMBARA OF ASAF-UD-DAULA, LUCKNOW, DISTRICT LUCKNOW.—The panels of geometrical mouldings and decorative stucco-works of the main central hall have been repaired with lime-mortar matching the original.

154. RESIDENCY BUILDINGS, LUCKNOW, DISTRICT LUCKNOW.—Staircases, jambs, arched door-lintels and wide joints were underpinned with *lakhauri* bricks and lime mortar. The top portion of the exposed wall of the south west side has been watertightened and pointed with lime mortar after removing the worn-out plaster and three courses of the *lakhauri* bricks.

155. RUMI DARWAZA, LUCKNOW, DISTRICT LUCKNOW.—The stucco work and decorative designs of the northern parapet and tiers of the third storey and the *chhajja* of the fourth storey have been restored with lime cement mortar.

156. MADAN-MOHAN TEMPLE, BRINDAVAN, DISTRICT MATHURA.—The gate and inner platform have been repaired by moulded *dasa* stone while the stones of the facade were replaced.

157. R. C. CEMETERY, SARDHANA, DISTRICT MEERUT.—Moulded and carved plaster work of the outer portion of the dome has been so repaired as to give a look of original colour and texture. The compound wall built of *lakhauri* bricks has also been repaired and pointed.

158. MAJHERA, MUZAFFARNAGAR, DISTRICT MUZAFFARNAGAR.—The marble platform and the dome have been pointed.

NORTH-WESTERN CIRCLE

Haryana

159. FIRUZ SHAH'S PALACE, HISSAR, DISTRICT HISSAR.—The roof was watertightened with lime concrete after removing the accumulated earth and dead concrete.

160. FIRUZ SHAH'S MOSQUE (LAT-KI-MASJID), HISSAR, DISTRICT HISSAR.—The roof was made watertight with lime-concrete after removing the dead concrete.

161. NORTHERN GATEWAY OF MUGHAL SARAI, GHARAUNDA, DISTRICT KARNAL.—The fallen portions of vaults and wall made of *lakhauri* bricks have been restored in lime-mortar while the ornamental work of the bastion was also done up.

162. CEMETERY, KARNAL, DISTRICT KARNAL.—The missing as well as damaged *lakhauri* brick work was made good in lime mortar on the graves. The boundary wall and graves were plastered with matching lime-mortar.

163. KABULI-BAGH MOSQUE, PANIPAT, DISTRICT KARNAL.—The decayed plaster of the minor domes, pendentives and parapet wall was restored in lime-mortar.

164. SHEIKH CHILLI'S TOMB, THANESAR, DISTRICT KURUKSHETRA.—The marble veneers of the dome were reset and the joints pointed with white cement matching the original shade of the stone.

Wall surface, spandrels, a few arcades in the north wing of the *madrasa* of the tomb were replastered with lime-*surkhi* mortar. The original moulded decorations, particularly floral and geometrical patterns, were reproduced.

165. IBRAHIM KHAN'S TOMB, NARNAUL, DISTRICT MAHENDRAGARH.—The rubble masonry of a fallen portion of the segregation wall on the back side of the tomb had been restored while the joints were painted in lime-mortar.

Himachal Pradesh

166. LAKSHMI DAMODARA TEMPLE, CHAMBA, DISTRICT CHAMBA.—The weathered and tottering roof of the temple had been replaced by a fresh wooden one and slate stones fixed over it in original style.

167. LAKSHMINARAYANA TEMPLE, CHAMBA, DISTRICT CHAMBA.—A portion of the retaining wall which has gone out-of-plumb on the southern side of the temple was reconstructed in rubble masonry. The rank vegetation has also been removed.

168. KATOCH PALACE, TIRA SUJANPUR, DISTRICT HAMIRPUR.—The plinth-wall of the *darbar*-hall on the south side was reset after dismantling the bulged out portions. The roof on the western side of the entrance gate was provided with lime-concrete.

169. NARBADESVARA TEMPLE, TIRA SUJANPUR, DISTRICT HAMIRPUR.—The enclosure wall was strengthened further by providing a course of rubble masonry.

170. CHEMMOLONG, KILKHANG AND SHERLONG GUMPHAS, TABO, DISTRICT LAHAUL SPITI.—Random rubble masonry was provided in the platform to prevent percolation of water. A mud concrete flooring was laid to prevent paintings from dust. Outer walls were plastered with mud and the wood works repainted.

Jammu and Kashmir

171. REMAINS OF DIWAR, PARASPUR (PARIHASPUR), DISTRICT BARAMULLA.—Debris accumulated in the northern and south-western sides of the *chaitya* were cleared.

172. PRATAPASVAMI TEMPLE, TAPAR, DISTRICT BARAMULLA.—Barbed-wire fencing has been provided around the temple.

173. BUDDHIST MONASTERY, ALCHI, DISTRICT LEH.—The bulged buttresses in front of Sumsukgumpha were dismantled and reconstructed in cement mortar. The compound wall was also reconstructed. Masonry walls including the restored ones were plastered with mud mixed with husk.

174. GONGKHONG GUMPHA, LEH, DISTRICT LEH.—The roof of the monastery (pl. LI) was watertightened by providing a fresh earth packing over an alkathene sheet. The parapet walls were plastered with husk and paste.

175. OLD CASTLE, LEH, DISTRICT LEH.—The cracks developed on the southern walls of the superstructure were stitched and a retaining wall was provided to arrest further damage to the castle. A wall was raised with stones in mud mortar enriched with special *markala* clay.

176. EXCAVATED REMAINS, HARWAN, DISTRICT SRINAGAR.—The clearance of debris from the excavated site is in progress.

177. MOSQUE OF AKHUN MULLA SHAH, SRINAGAR, DISTRICT SRINAGAR.—Steps in front of the mosque were restored with the ornamental and moulded stones. Cracks in the dome and walls were also stitched. After removing the dead mortar the enclosing structure on the north was pointed.

178. PANDRETHAN TEMPLE, SRINAGAR, DISTRICT SRINAGAR.—A *pukka* drain in random rubble masonry was provided for ensuring regular discharge of the tank water.

179. PARIMAHAL, SRINAGAR, DISTRICT SRINAGAR.—The faces of the retaining walls of terraces 1, 2 and 3 were restored with the random rubble masonry. *Chhajjas* made of slate stones

were provided and a coat of lime mortar was applied over the top walls in order to prevent percolation of water. Painting of joints in stone-work was also done in lime mortar.

180. PATTHAR MASJID, SRINAGAR, DISTRICT SRINAGAR.—The bottom side of the archways, pillars and domed ceiling including the squinches were plastered. Intricate geometrical and floral patterns were reproduced in one of the bays of the prayer hall after scraping out the modern cement-plaster.

181. SANKARACHARYA TEMPLE, SRINAGAR, DISTRICT SRINAGAR.—One side of the octagonal parapet around the temple was restored in *devri* stones after dismantling the incongruous modern brick masonry.

182. GROUP OF TEMPLES, KIRAMCHI, DISTRICT UDHAMPUR.—The southern wall of the *mandapa* of the Temple 1 was restored. The out-of-plumb rear platform walls of Temples 1 and 2 were restored and after replacing the missing ones, the weathered stones replaced.

183. RAJA SUCHET SINGH'S FORT, RAMNAGAR, DISTRICT UDHAMPUR.—Cracks, which developed in the north-eastern corner of the monument, were stitched with coarse rubble masonry in lime cement mortar. The parapet wall was also rendered watertight.

184. SAMADHI OF RAJA SUCHET SINGH'S QUEEN, RAMNAGAR, DISTRICT UDHAMPUR.—Extensively-damaged *chhajja* round the roof-terrace of the *samadhi* was restored with dressed stones in lime mortar.

The modern G. I. sheet roofing over the rooms along the eastern wall of the enclosure was replaced with lime mortar terrace over the wooden support.

Punjab

185. RAMBAGH GATE, AMRITSAR, DISTRICT AMRITSAR.—After removing the modern cement plaster, the inner rooms and the outer walls were lime-plastered and ornamental work is being restored.

186. FORT, BHATINDA, DISTRICT BHATINDA.—The collapsed and missing portion of the inner face of the fortification wall (pl. LII) was restored in lime-mortar.

Fallen bastion no. SOB-3 was raised to a height of 11 m by providing *lakhauri* bricks in lime mortar for the outer ring and packing the core with clay.

187. SHAMSHER KHAN'S TOMB, BATALA, DISTRICT GURDASPUR.—The collapsed western half of the enclosure was reconstructed using *lakhauri* bricks laid in lime mortar. Also, the cracks on the south-eastern *burj* of the enclosure were stitched. The front courtyard was provided with fresh lime-concrete.

188. SARAI AND GATEWAY, DAKHUI, DISTRICT JULLUNDUR.—Wild vegetations on the walls adjacent to the western gateway were removed. The outer face of the western wall was reconstructed using *lakhauri* bricks in lime mortar.

189. NAKODAR TOMB, NAKODAR, DISTRICT JULLUNDUR.—The moss and lichen on the domes of Mohammad Momin and Haji Jamal's tomb were cleared.

190. SARAI AND GATEWAY, NURMAHAL, DISTRICT JULLUNDUR.—The western enclosure wall was reconstructed in lime mortar using *lakhauri* bricks. Eradication of vegetation growth was also attended to.

SOUTHERN CIRCLE

Kerala

191. BEKAL FORT, PILLIKERE, DISTRICT CANNANORE.—In order to watertighten and strengthen the fort walls, top courses of the wall are being removed and relaid in combination mortar while joints of the remaining portion of the fort wall are being pointed.

Pondicherry

192. SRI MULANATHASVAMI TEMPLE, BAHOUR, DISTRICT PONDICHERRY.—The whitewash and oil stains from the surface of the wall of the sanctum were cleared by using mild chemicals and fresh water. Damaged plaster from the compound walls and the entrance-*mandapa* was removed and portions above were replastered in combination mortar. To prevent decay a preservative oil was applied to the wooden members of the *vahana-mandapa.*

193. SRI TIRUKANDESVARAR TEMPLE, MANDAGADIPATTU, DISTRICT PONDICHERRY.—The whitewash and oil-stains from the stone wall surface, pillars and ceiling of the sanctum and *maha-mandapa* were cleaned by using fresh water. Earth in open courtyard was levelled and sectioned to prevent stagnation of rain water. Grills were provided at open spaces of the Sanisvara sub-shrine. The roof of the main temple was made watertight by laying brick-jelly concrete.

194. SRI VARADARAJAPERUMAL TEMPLE, TIRUBHUVANAI, DISTRICT PONDICHERRY.—The weathered terrace after dismantling of the *vahana-mandapa* and *madapalli* was watertightened by laying brick-jelly concrete in lime mortar with two courses of flat tiles in cement mortar mixed with crude oil and the top plastered with combination mortar.

195. SRI PANCHANADISVARA TEMPLE, TIRUVANDAR KOIL, DISTRICT PONDICHERRY.—Undulated stone flooring in northern corner was relaid in combination mortar over a bed of brick jelly concrete in lime mortar and the joints were pointed with cement mortar. The wooden members were painted to prevent decay.

Tamil Nadu

196. IRAVATANESVARA TEMPLE, KANCHIPURAM, DISTRICT CHINGLEPUT.—The wooden doors with welded-mesh were painted to prevent rusting and decay.

197. KAILASANATHA TEMPLE, KANCHIPURAM, DISTRICT CHINGLEPUT.—Temple doors, angle-iron posts of the fence and the gates with welded-mesh were painted.

198. SRI PIRAVATANESVARA TEMPLE, KANCHIPURAM, DISTRICT CHINGLEPUT.—Angle-iron posts of the fencing, gate-frame and temple-doors were provided with a smoky grey-coloured paint to prevent rusting and decay.

199. DHARMARAJA-RATHA, MAHABALIPURAM, DISTRICT CHINGLEPUT.—The eastern side was fenced with barbed-wire and R.C.C. posts. Wide steps in cut-stone masonry were provided in place of narrow damaged steps on the eastern side of the monument.

200. OLAKANNESVARA TEMPLE, MAHABALIPURAM, DISTRICT CHINGLEPUT.—The dead mortar was removed from the cracks in the southern and the northern walls of the temple. The work of pointing the cracks with combination mortar is in progress.

Dead plaster was removed from the roof and the surface replastered with combination mortar. The damaged and old grilled-door was replaced by a new one.

201. DHARMESVARA TEMPLE, MANIMANGALAM, DISTRICT CHINGLEPUT.—Jungle on the northern side was removed. Wooden doors, gate and angle-iron posts of the fence around the temple were painted.

202. CLIVE BUILDING, FORT ST. GEORGE, DISTRICT MADRAS.—The walls replastered with combination mortar after raking out the salt-affected and weathered plaster. The verandahs in the second floor were watertightened by plastering the tiled roof with lime mortar.

203. FORT MUSEUM BUILDING, BLOCK XXXVI, FORT ST. GEORGE, DISTRICT MADRAS.—The building was externally painted with waterproof cement and the wooden members with synthetic enamel paint. The store was watertightened with flat tiles set in cement mortar and top plastered with lime mortar. The water outlets on top of the terrace were opened and the A. C. down-pipe was laid to drain off the rain water.

204. ST. MARY'S CHURCH, MADRAS, DISTRICT MADRAS.—A layer of flat tiles was laid in the vaulted roof of the central aisle and the top plastered. The other two aisles were also plastered in combination mortar and the surface painted with bitumen tar to prevent leakage.

205. FORT WALL, FORT ST. GEORGE, DISTRICT MADRAS.—The fallen portion of the arched wall of the collapsed vaulted chamber on the north-eastern side has been restored up to the arch level.

206. DELHI GATE, ARCOT, DISTRICT NORTH ARCOT.—The remains of the buried structures were brought to light after clearing the debris of fallen structures. The missing wooden shutters of the windows were replaced and the wooden members were treated with painting.

207. MASJID AND POND, ARCOT, DISTRICT NORTH ARCOT.—The flight of steps leading to the pond (pl. LVI) to the west of the citadel was restored in conformity with the original.

208. ROCK-CUT CAVE, KURANGANILMUTTAM, DISTRICT NORTH ARCOT.—The broken stone pillar of the cave was properly mended. The frontage of the cave was provided with stone flooring and gravelling to avoid stagnation of rain water.

209. SRI SOMANATHASVAMI TEMPLE, MELPADI, DISTRICT NORTH ARCOT.—The original ground level of the first and second *gopurams* was exposed after the removal of accumulated earth. The damaged stone flooring was reset. The coping of the compound wall and that of *thirumadil* had been watertightened by plastering while the damaged brick compound wall was underpinned.

210. ROCK-CUT CAVE, NARASAMANGALAM, DISTRICT NORTH ARCOT.—Approach road was constructed within the protected area between Caves 1 and 2.

211. SRI CHANDRAMAULISVARA TEMPLE, NATTERY, DISTRICT NORTH ARCOT.—The work of dismantling and re-erecting the bulged out *maha-mandapa* was continued and the ceiling slabs, pillars and pillar-capitals as also the beams of the *maha-mandapa* were carefully removed and brought down. The ceiling slabs in new stones were prepared to replace the missing ones and the broken ornamental architectural members mended. The work is in progress. The protected area was levelled after it was cleared of all accumulated earth.

212. ROCK-CUT TEMPLE, SIYAMANGALAM, DISTRICT NORTH ARCOT.—The dilapidated well was repaired and the silt cleared. Inside the *mandapa,* undulated stone floor was reset.

213. JAINA TEMPLES, TIRUMALAI, DISTRICT NORTH ARCOT.—The undulated stone flooring of the *mandapa* and the small shrine outside the main temple was removed and reset. The walls of the shrine were plastered in combination mortar.

214. HILL AT VALLIMALAI, DISTRICT NORTH ARCOT.—Loose boulders in front of the cavern were carefully broken and removed and the frontage of the cavern was provided with stone flooring.

215. SRI SUBRAHMANESVARASVAMI TEMPLE, VALLIMALAI, DISTRICT NORTH ARCOT.—The accretionary matter on walls of the *mandapa* was removed, while the undulated stone flooring of the *mandapa* was reset and the roof watertightened.

216. FORT, VELLORE, DISTRICT NORTH ARCOT.—Open stone joints of the portion of the fort wall near the Court building were filled with stone chips in cement mortar and pointed with combination mortar to match with the original colour and texture. The western and southern sides of the fort were fenced with barbed wire.

217. SRI JALKANTESVARA TEMPLE, VELLORE, DISTRICT NORTH ARCOT.—Whitewashed layers over the inner *prakara* wall were removed with fresh water and mild chemicals.

218. JAINA TEMPLE, METTUPUDUR, DISTRICT PERIYAR.—The terrace of the *madapalli* was watertightened and the teak-wood windows and panelled doors were provided to ensure safety. The wall surfaces inside the Amman shrine were provided with recess-pointing and the out-of-plumb wall and pilasters reset.

219. SIKHANATHASVAMI TEMPLE, KUDUMIAMALAI, DISTRICT PUDUKKOTTAI.—The replacement of the damaged wooden members of the temple with new teak-wood is in progress.

220. ROCK-CUT SIVA TEMPLE, TIRUMAYAM, DISTRICT PUDUKKOTTAI.—The watertightening of the terrace is in progress.

221. FORT ATTUR, DISTRICT SALEM.—The protected area around the granary, eastern gate and *durbar* hall was fenced with barbed wire. The floor of the two granaries was laid with stone-jelly concrete and the top plastered with combination mortar. The missing steps of the granary were also reconstructed.

222. FORT AND TEMPLE, CHINNAKAVANDANUR, DISTRICT SALEM.—The uneven flooring of the *mandapa* was reset.

223. SRI NARASIMHASVAMI TEMPLE, NAMAKKAL, DISTRICT SALEM.—The reconstruction of the compound wall on the northern side is in progress.

224. SRI RANGANATHASVAMI TEMPLE, NAMAKKAL, DISTRICT SALEM.—The accretionary stone steps and basement in front of the rock-cut cave were removed in order to expose the original features. The original steps cut into the rock bearing inscriptions on cither side were brought to light. The uneven stone flooring of the *mandapa* was reset while the interior walls were cleared of the whitewashed layers.

225. FORT, GINGEE, DISTRICT SOUTH ARCOT.—The debris of the fallen wall of Krishnagiri fort on the western side which is being reconstructed had been cleared. The reconstruction of the fallen wall of the Rajagiri fort is in progress and the vaulted roof of the granary inside was replastered with combination mortar.

226. SIVA TEMPLE, GINGEE, DISTRICT SOUTH ARCOT.—In the southern bay of the pillared *mandapa* new slabs for the ceiling have been provided.

227. SADAT-UL-ULLAH KHAN'S MOSQUE, GINGEE, DISTRICT SOUTH ARCOT.—The outer and inner walls of the mosque were provided with yellow ochre-wash mixed with shell-lime. The terrace of the mosque was made watertight. The inside parapet over the terrace has been replastered in combination mortar after removing the decayed plaster.

228. VENKATARAMANA TEMPLE, GINGEE, DISTRICT SOUTH ARCOT.—The whitewash and colour wash stains from the surface of the stone walls and ceiling of the *maha-mandapa* of the temple were removed by using mild chemicals and fresh water.

229. RAJAGIRI FORT, GINGEE, DISTRICT SOUTH ARCOT.—The weathered plaster from the walls of the inside chambers as also of the ceiling of the horse stables inside the inner citadel of the fort was removed and replastered with combination mortar. The damaged floor of the chamber has been relaid with brick-jelly concrete and top surface plastered with combination mortar. The fallen arches of the corridor have been underpinned and surface plastered. .

230. DEVI KAMALAKANNI AMMAN TEMPLE, RAJAGIRI FORT, DISTRICT SOUTH ARCOT.—The area around the temple was levelled. The damaged plaster from the walls of the shrine has been removed and the wall surface replastered with combination mortar. The damaged floor inside the temple was dismantled and relaid in cement concrete and the top plastered.

231. ROCK-CUT CAVE, MANDAGAPATTU, DISTRICT SOUTH ARCOT.—Undulated stone flooring in the open area in front of the temple was removed and reset.

232. SRI PATTABHIRAMA TEMPLE, NARASINGA RAYANPETAI, DISTRICT SOUTH ARCOT.—The original plinth of the monument was exposed to view.

233. TALAGIRISVARA TEMPLE, PANAMALAI, DISTRICT SOUTH ARCOT.—The roof of Amman shrine has been rendered watertight.

234. SRI NITIHSVARASVAMI TEMPLE, SRIMUSHNAM, DISTRICT SOUTH ARCOT.—Grills were provided in the *maha-mandapa* of the temple for safeguarding valuable bronzes and sculptures, and wooden and iron members were painted.

235. SRI AIRAVATESVARA TEMPLE, AMMAN SHRINE, DARASURAM, DISTRICT THANJAVUR.—The work of laying stone flooring around the Amman shrine over a bed 100-mm thick brick-jelly concrete and stones set in cement mortar with joints pointed in combination mortar is in progress.

236. EXCAVATED SITE, PALLAVANESWARAM (KAVERIPATTINAM), DISTRICT THANJAVUR.—After removing the loose earth and vegetational growth over the exposed ancient brick structures, the top two courses were removed and reset with combination mortar for water-tightening the same.

237. SRI BRIHADISVARA TEMPLE, THANJAVUR, DISTRICT THANJAVUR.—The work of pointing of the stone joints, grouting of crevices of stone work and filleting of the stucco works including small patch-plastering with combination mortar which started last year in three lower *talas* of the Keralantaka-*gopuram* is now in progress. The white and red oxide strips over the basement on all faces of the main shrine, *maha-mandapa,* and the Tyagaraja *mandapa* were removed with light chemicals and fresh water. The work is in progress.

SOUTH-EASTERN CIRCLE

Andhra Pradesh

238. VIRABHANDRASVAMI TEMPLE, LEPAKSHI, DISTRICT CHITTOOR.—The roof of the Papanasesvarasvami temple and the *natya-mandapa* has been watertightened by removing the damaged tar-laid sheets and laying a bed of cement mortar with waterproof compound and fixing pressed flat tiles of 15 x 15 cm.

239. CHENNAKESVARASVAMI TEMPLE, SOMPALLE, DISTRICT CHITTOOR.—The temple complex is provided with a tubular gate secured to iron posts.

240. CHARMINAR, HYDERABAD, DISTRICT HYDERABAD.—The floral designs over the mosque and the *minarets* on the south-west and north-east of the Charminar have been restored properly by using *savara* lime mortar mixed with jaggery etc. to match the original.

241. GOLCONDA FORT, HYDERABAD, DISTRICT HYDERABAD.—The dislodged stone slabs of Naginabagh area have been reset. As a protective measure the openings at *silaikhana* are covered with mesh shutters fixed to iron frames and properly pointed.

242. SANGAMESVARASVAMI TEMPLE, KUDAVALLI, DISTRICT MAHBUBNAGAR.—The entire temple with its *prakara* has been dismantled and shifted to Alampur, which is 25 km away from the original temple site, for its reconstruction.

Karnataka

243. SRI MAHADEVA TEMPLE, ITAGI, RAICHUR.—To prevent rain water from entering the foundation, a flagstone floor, 1-metre wide, was constructed on the eastern, southern and western sides of the temple.

SOUTH-WESTERN CIRCLE *Maharashtra*

244. ROCK-CUT CAVES, AJANTA, DISTRICT AURANGABAD.—To lessen the glare and intensity of light, the comptalux lamps have been fixed at railing level for seeing the paintings as per the recommendation of the Expert Committee. The work is in progress.

245. BIBI-KA-MAQABARA, AURANGABAD, DISTRICT AURANGABAD.—Undulated sunken rubble stone pavement in front of the main gate of Rabia Durrani's tomb was reset providing proper level.

The bulged screen wall on the western side of the main tomb was reconstructed as per the original.

246. RAYGAD FORT, RAYGAD, DISTRICT COLABA.—Fallen retaining wall between Ranivasa and Ashthapradhan-wada was partially reconstructed with the available stones at the site.

247. SHIVAI TEMPLE, JUNNAR, DISTRICT PUNE.—The fallen fortification wall near Shivai temple was reconstructed in cement-mortar with the available stone at the site as per the original. The work is in progress.

248. PANAHLE KAZI CAVES, PANAHLE KAZI, DISTRICT RATNAGIRI.—The debris on top of the cave and courtyard was removed carefully to expose the original feature of the caves. The construction of a retaining wall in front of the cave is in progress.

249. SIVA TEMPLE, AMARNATH, DISTRICT THANE.—The decayed cement pointing of the *sikhara* was raked out and a coat of tarloid was applied in order to stop water leakage.

WESTERN CIRCLE

Goa, Daman and Diu

250. CHURCH OF HOLY JESUS, MOTI DAMAN, DAMAN.—The roof of the church was repaired by providing new Mangalore tiles and wooden planks and rafters. Decayed wooden windows were replaced by new ones matching the original. Preservatives were applied on the entire wood-work. Decayed lime plaster on the walls was replaced by matching one. The out-of-plumb decorative stone pillars were dismantled and reset.

251. FORT WALL, MOTI MAMAN, DAMAN.—Dilapidated buttresses of the fort wall were repaired. Fallen and loose rubble masonry was replaced by fresh rubble masonry. Voids in the wall masonry were filled in to arrest the growth of vegetation and further disintegration. The adjacent area was levelled by earth filling.

252. ST PAUL'S CHURCH, DIU.—The superstructure was made watertight and the cracks grouted. The decayed lime-plaster of the roof and the domes was replaced by lime-plaster as per the original.

Gujarat

253. ASTODIA GATE, AHMADABAD, DISTRICT AHMADABAD.—The collapsed roof of the gate was rebuilt.

254. MALIK ALAM MOSQUE, AHMADABAD, DISTRICT AHMADABAD.—On the eastern side a compound wall was constructed.

255. EXCAVATED SITE, LOTHAL, DISTRICT AHMADABAD.—Mud-brick structures in the lower town area were conserved by providing newly-prepared bricks.

256. RANCHHOD RAI TEMPLE AND KUSESVARA TEMPLE, MUL DWARKA, DISTRICT AMRELI.—The worn-out and damaged stone members were replaced by matching ones.

257. DARBARGARH, SIHOR, DISTRICT BHAVNAGAR.—The missing portion of the rubble masonry of the fort wall was reconstructed.

258. DVARAKADHISA TEMPLE, DWARKA, DISTRICT JAMNAGAR.—In continuation of previous year's work *(1979-80,* p. 148) various architectural members viz., pillars, *kumbhis,* capitals, lintels etc., were duly chiselled and carved in Chorwad limestone for carrying out further repairs to the badly weathered northern and western porches. The work is in progress.

259. RUKMINI TEMPLE, DWARKA, DISTRICT JAMNAGAR.—Stone *jalis* were prepared and fixed in the *sabha-mandapa* as per the original.

260. VISHNU TEMPLE (NO. 3), DWARKA, DISTRICT JAMNAGAR.—The missing southern portion of the *sabha-mandapa* of this newly-discovered temple was restored and provided with stone flooring.

261. HOUSE WHERE MAHATMA GANDHI WAS BORN, PORBANDAR, DISTRICT JUNAGADH.—The wooden members were given a coat of oil paint in order to prevent weather effects.

262. EXCAVATED SITE, CHAMPANER, DISTRICT PANCH MAHALS.—Fallen debris of the fort wall near the Delhi gate was removed after sorting out useful material. The out-of-plumb and hanging ashlar masonry was dismantled and reset in lime-mortar. Tops of the walls were made watertight with lime-cement concrete. The top of the three cells was watertightened. Heaps of debris lying nearby were removed after retrieving useful material from the same.

263. RUDRAMALA TEMPLE, DESAR, DISTRICT PANCH MAHALS.—The out-of-plumb ashlar masonry of the top and bottom courses of the sanctum was dismantled and reset as per the original. The missing front portion of the *sabha-mandapa* was provided with random rubble masonry in lime-mortar and lime-cement concrete over the floor.

264. OLD ARMENIAN TOMBS, SURAT, DISTRICT SURAT.—Fresh lime-plaster was applied on walls, pillars and ceilings etc. as per the original. Cracks in the roof were grouted with cement mortar and the brick masonry was provided for the missing part and debris lying nearby removed.

Rajasthan

265. ADHAI-DIN-KA-JHONPRA, AJMER, DISTRICT AJMER.—The plinth on the back side of the mosque has been provided to prevent percolation and seepage of rain water into the foundation. The work is in progress.

266. GROUP OF TEMPLES, ARTHUNA, DISTRICT BANSWARA.—A stone pavement was provided to Siva temple nos. 1 and 2 (pl. LIII) on the northern and the western sides respectively. A stone

pavement was also provided to a Saiva shrine of Nilakantha Mahadeva group of temples (pl. LIV). The missing ashlar masonry and stones of the *kakshasana* were replaced by new stones as per the original.

267. FORT, CHITTAURGARH, DISTRICT CHITTAURGARH.—The compound of the Annapurna Mata temple was provided with stone pavement on lime concrete bed. To prevent water percolation in Bhimlat tank, bulged-out and decayed ashlar masonry was dismantled and reset. Moreover, bulged-out stone masonry of the Ghee-ki-bavdi was dismantled and reset.

268. DEVASOMNATHA TEMPLE, DEVSOMNATHA, DISTRICT DUNGARPUR.—The sunken stone flooring of the *sabha-mandapa* was dismantled and replaced by a new stone flooring. Missing ashlar stone masonry and *kakshasana*-stones were also provided.

269. EXCAVATED SITE, RANGMAHAL, DISTRICT GANGANAGAR.—To prevent encroachment, the excavated site was fenced with barbed wire on two sides. The work is in progress.

270. FORT, JAISALMER, DISTRICT JAISALMER.—In continuation of the previous year's work *{1979-80,* p. 150) ashlar masonry of the western fortification wall adjoining the bastion was dismantled and reset as per the original.

271. FORT, KUMBHALGARH, DISTRICT UDAIPUR.—In order to prevent water seepage into foundation, a stone pavement was provided to the floor of the Golerao temple no. 6 (pl. LV). The out-of-plumb ashlar masonry was dismantled and reset while the damaged domes were provided with cement concrete as per the original. The debris lying near the Rani fort was removed. The random rubble masonry of the fort wall was dismantled and reset in lime mortar. Approach steps in random rubble masonry to the Nilakantha Mahadeva temple were also provided.

MONUMENTS MAINTAINED BY THE STATES

ANDHRA PRADESH

1. KHAJANA BUILDING, GOLCONDA, DISTRICT GOLCONDA.—The building was plastered and white-washed.

2. QUTUBSHAHI TOMB, GOLCONDA, DISTRICT GOLCONDA.—Minor repairs to the mortuary building *doodbowli* (well) were done as needed.

3. NAGNOOR TEMPLES, KARIMNAGAR, DISTRICT KARIMNAGAR.—Conservation works included clearing of the rank vegetation and fixing of boundary stones.

4. RAMA'S TEMPLE, RACHAKONDA FORT, DISTRICT MAHBOOBNAGAR.—The damaged part of the *mandapa* was repaired.

5. SOMESVARASVAMI TEMPLE, KULPAK, DISTRICT NALGONDA.—Ceiling slabs of the *nandi-mandapa* were removed and galleries and roof were repaired.

6. TEMPLES, PILLALAMARRI, DISTRICT NALGONDA.—Temples were repaired.

7. PRINCESS HASSINA BEGUM MOSQUE, JANWADA, DISTRICT RANGAREDDY.—The mosque was repaired.

8. CAIRNS, LINGAMPALLI, DISTRICT RANGAREDDY.—Cairns were fenced with barbed-wire over angular iron rods.

GOA

9. CAVE TEMPLES, KHANDEPAR, DISTRICT GOA.—An extensive debris clearance, besides some minor conservation work of the cave-temples, was undertaken and completed.

10. FORT, CAPE RAMA, CANACONA TALUK, DISTRICT GOA.—Conservation work of the fort was completed.

GUJARAT Special repairs have been carried out

in the following state protected monuments.

11. BHUJIO KOTHO, JAMNAGAR, DISTRICT JAMNAGAR.

12. LAKHOTO KOTHO, JAMNAGAR, DISTRICT JAMNAGAR.

13. KLRTI STAMBHA (PL. LVII), MACHARDA, DISTRICT JAMNAGAR.

14. SARTANJI'S CHORO, PORBANDAR, DISTRICT JUNAGARH.

15. SMT. KASTURBA'S HOUSE, PORBANDAR, DISTRICT JUNAGARH.

16. VADI-MEDI, MANZAL, DISTRICT KACHCHH.

17. DUDHIA VAV, MAHEMADABAD, DISTRICT KHEDA.

18. SHAKTI KUND, AAKHAJ, DISTRICT MAHESANA.

19. SIVA TEMPLE NOS. 3 & 4, KANKANPUR, DISTRICT PANCH MAHALS.

20. GEBANSHA VAV, PAVAGADH, DISTRICT PANCH MAHALS.

21. BHEM'S CHORI, LAVANA, DISTRICT PANCH MAHALS.

22. SIVA TEMPLE, SANT, DISTRICT PANCH MAHALS.

23. SIVA PANCHAYATAN TEMPLE, BHETALI, DISTRICT SABAR KANTHA.

24. KUND AND TEMPLE, ABHAPUR, DISTRICT SABAR KANTHA.

25. SARNESHVARA MAHADEVA TEMPLE, ABHAPUR, DISTRICT SABAR KANTHA.

26. SIVA PANCHAYATAN, ATARSUMBA, DISTRICT SABAR KANTHA.

27. RAJESHWARI GATE, ZINZUWADA, DISTRICT SURENDRANAGAR.

 KARNATAKA The conservation work on the following has been completed.

28. SRI HARIHARESHWARA TEMPLE, HARIHARAPURA, DISTRICT HASSAN.

29. PRASANNA KRISHNASWAMY TEMPLE, FORT, DISTRICT MYSORE.

30. SRI VARAHASWAMI TEMPLE, FORT, DISTRICT MYSORE.

The conservation work of the following monuments is in progress :

31. DARGAH, HAZRAT SIRAJUDDIN JUNAIDI, DISTRICT GULBARGA.

32. NAGA REMAINS, CHITAPUR, DISTRICT GULBARGA.

33. SRI CHANNAKESHAVA TEMPLE, HULLEKERE, DISTRICT HASSAN.

34. MAHABALESHWARA TEMPLE, CHAMUNDI HILLS, DISTRICT MYSORE.

35. TRINAYANESWARA TEMPLE, FORT, DISTRICT MYSORE.

36. SRI SANTINATHA BASTI, JANANATHAPURA, DISTRICT SRAVANABELAGOLA.

MADHYA PRADESH

37. PALACE, ISLAMNAGAR, DISTRICT BHOPAL.—The area around the place was fenced.

38. FORT, GOHAD, DISTRICT BHIND.—After clearance of debris and jungle a part of the loose masonry was reset.

39. JAMALESVARA TEMPLE, JAMLI, DISTRICT DHAR.—The protected area around the temple was fenced.

40. KHARBHUJA MAHAL, DHAR, DISTRICT DHAR.—The roof of the palace was made watertight after filling the cracks.

41. SHEESH MAHAL, DHAR, DISTRICT DHAR.—Walls were watertightened and the area had been fenced.

42. RAM MANDIR, MATIA KUI AT PAGARA, DISTRICT JABALPUR.—The monument was restored.

43. RANGMAHAL, VIJAYARAGHOGARH, DISTRICT JABALPUR.—A part of the complex was watertightened after removing the jungle and debris.

44. BALLALESVARA TEMPLE, UN, DISTRICT KHARGONE.—The uneven flagstone floor around the temple was conserved and subsidiary shrines had been exposed.

45. MOTI MAHAL AND RAI BHAGAT KI KOTHI, RAMNAGAR, DISTRICT MANDLA.—The jungle and debris of the monument were removed.

46. FORT, MADHOGARH, DISTRICT SATNA.—The clearance of jungle and debris was undertaken.

47. SHIV MANDIR, CHORPUR, DISTRICT SHIVPURI.—The monument was fenced with barbed-wire.

48. LOHANGI HILL, VIDISHA, DISTRICT RAISEN.—The protected area was fenced, jungle cleared and the flight of steps repaired and restored.

ORISSA

49. AKHANDALAMANI TEMPLE, AREDI, DISTRICT BALASORE.—Conservation work is in progress.

50. BHADRESVARA TEMPLE, BHADRESWAR, DISTRICT CUTTACK.—Conservation and renovation of this temple have been taken up.

51. CHARCHIKEYEE AND KAPILESVARA MAHADEVA TEMPLE, KUNDESWAR, DISTRICT CUTTACK.—Both these dilapidated monuments have been conserved and renovated.

52. KAPILESVARA MAHADEVA TEMPLE, KOPALA, DISTRICT CUTTACK.—Conservation work was completed.

53. MADHAVA TEMPLE, MADHAVA, DISTRICT CUTTACK.—The work is in progress.

54. SOPNESVARA TEMPLE, ADASPUR, DISTRICT CUTTACK.—The temple up to the *gandi* portion has been conserved.

55. YUDHISTHIRA GROUP OF TEMPLES, BHANISHA, DISTRICT CUTTACK.—The work of conservation and renovation of the temple is in progress.

56. BUDDHANATH TEMPLE, GAREDIPANCHANA, DISTRICT PURL—The conservation and renovation of the *jaga-mohana* have been taken up in the first stage.

57. CHANDESVARA TEMPLE, CHANDESWAR, DISTRICT PURL—The conservation and renovation work which have gone up to the *bada* portion of the temple is in progress.

58. ISVARADEVA TEMPLE, JIUNTI, DISTRICT PURL—The conservation of both the sanctum and the *jaga-mohana* was completed.

RAJASTHAN The following

monuments were taken up for preservation :

59. PALACE, AMBER, DISTRICT JAIPUR.

60. HAWA MAHAL, DISTRICT JAIPUR.

The Department of Archaeology and Museum, Jaipur, Government of Rajasthan, carried out repairs through the agency of P.W.D. Rajasthan in the following monuments.

61. OLD FORT OF AKBAR, DISTRICT AJMER.

62. KAMRA KHAS AND ROOF, DISTRICT BHARATPUR.

63. HAWA MAHAL, DISTRICT JAIPUR.

64. FORT, NAHARGARH, DISTRICT JAIPUR.

65. OLD AMBER PALACES, DISTRICT JAIPUR.

66. PATWA HAVELIS, DISTRICT JAISALMER.

67. CENOTAPHS, MANDOR, DISTRICT JODHPUR.

68. CHAVANDA PALACES, DISTRICT UDAIPUR.

69. MUGHAL GATE, DISTRICT VAIRAT NAGAR.

WEST BENGAL

70. KASHINATH SIVA TEMPLE, AJHAPUR, DISTRICT BURDWAN.—The *atchala* terraced roof of the temple has been reconstructed keeping the proper alignment. The floors of the sanctum and the vestibule have been relaid with cement-mortar maintaining outlets with due slope. A boundary wall has been constructed.

71. JORBANGLA TEMPLE, BALLY DEWANGANJ, DISTRICT HOOGHLY.—Floors of the sanctum vestibule and *ratna* chambers above have been repaired by relaying lime concrete mortar. The staircase leading to the upper storeys have been thoroughly repaired. The wild vegetation has been removed. Vertical cracks on the corner of the three-arched openings on false windows and above the entrance door have been grouted. The horizontal crack on the ceiling has been stitched. The disloged bricks have been replaced by new ones, cut to size, maintaining the proper alignment.

72. NANDADULAL TEMPLE, GURAP, DISTRICT HOOGHLY.—The temple has been restored completely by relaying mortar on the terraced roof *(atchala)* maintaining a proper slope and alignment. Cracks were filled up and walls finished with lime punning over a coat of plaster.

73. RAJ RAJESVARA TEMPLE, DWAHATTA, DISTRICT HOOGHLY.—Debris around the brick temple was cleared and the plinth consolidated. The roof has been restored and made watertight. Floor and circumambulatory path of the temple were reconstructed, replacing a new matching wooden door and also erecting a boundary wall.

74. PATHAN PALACE, ADINA, DISTRICT MALDA.—Conservation work is in progress.

75. JAGANNATH TEMPLE, DIHI, BAHIRI, DISTRICT MIDNAPORE.—In continuation of the third phase of the work, the walls were plastered and iron gates installed.

76. RADHA GOVINDA JEW AND RADHA RAMANA JEW TEMPLE, GOVINDANAGAR, DISTRICT MIDNAPORE—Wide cracks on the facade and platform have been mended properly. Besides replastering the columns by composite mortar and filling up voids by plain bricks, cut to size, the missing designs have also been filled up with composite mortar. The joints below the curvilinear caves have been sealed to avoid deposition of vegetation. Lime punning has been done to inside walls and ceilings properly and a low brick wall covering the entire area was constructed.

77. SANTINATHA SIVA TEMPLE, CHANDRA KONA (MITRASENPUR), DISTRICT MIDNAPORE.—The floors of the *garbha-griha* and the vestibule have been stabilized providing outlets for ritual oblations. The missing terracotta panels, corner brackets, some portion of the facade and pillars have been filled with plane cut-tiles, chiselled into shape and set with fresh mortar. A boundary wall around the temple has been erected.

X. ARCHAEOLOGICAL CHEMISTRY

TREATMENT OF MONUMENTS AND PAINTINGS[1]

ANDHRA PRADESH

1. VIRABHADRASVAMI TEMPLE, LEEPAKSIH, DISTRICT ANANTAPUR.—The vegetational growth like algae and fungi and other superficial accretions of soot, dust and dirt were removed with aqueous 3 per cent ammonia teepol mixtures. The lime wash was removed by 3 to 4 per cent acetic acid solution in water while red ochre was removed with 3 per cent Rustodine. Afterwards a fungicidal coat was applied followed by a preservative coat. The mural paintings in the Virabhadrasvami temple has been chemically treated and preserved. The dirt, dust, cobwebs soot etc., have been removed by general cleaning and finally a preservative coating of 2 per cent polyvinyl acetate in toluene was applied.

2. RAJA-MAHAL FORT, CHANDRAGIRI, DISTRICT CHITTOR.—The colour wash, which was applied by a certain Italian Film Company in the year 1973, was removed from the walls and arches of the Durbar Hall in the first floor by using organic solvents.

3. TREATMENT OF ARMOURY IN GOLCONDA FORT, GOLCONDA.—Rifles, cannon and cannon balls of the Golconda fort were chemically treated during this year. As all the antiquities were covered with calcareous matter, dust, dirt and rust etc., the above accretions were removed by the application of an aqueous solution of sodium hexametaphosphate 5 per cent or 5 per cent sodium hydroxide in water or 5 per cent aqueous solution of deoxidine followed by soft brushing and flushing with abundant amount of distilled water. The antiquities were then given a general cleaning with a detergent and a mild base followed by thorough washing with water.

Rifles with wooden mounts were treated carefully so that the wood did not get soaked in water. They were separately cleaned on the affected parts with minimum quantity of an aqueous solution of 1 per cent teepol and ammonium hydroxide. After washing with water these were then treated with repeated applications of alcohol/acetone alone to bring out moisture from the pores of wood. The treated objects were then preserved.

4. SCULPTURES IN MOGHALRAJAPURAM CAVES II AND III, VIJAYAWADA, DISTRICT KRISHNA.—The sculptures in Caves II and III of Moghalrajapuram were badly affected by weathering effects, vegetational growths and cracks; flakings were also seen on most of the area of the above caves. The vegetational growth was removed by using an aqueous solution of teepol and ammonia and finally it was preserved with 3 per cent polyvinyl acetate in toluene.

DELHI

5. BHADON PAVILION, RED FORT, DELHI.—The western portion and the part of the northern portion were treated during this year: superficial accretions like dust, dirt, and greasy matters and soot deposits removed by using 2 per cent solution of ammonia and teepol in water by brushing with soft nylon brushes; stains and some accretions removed by using organic solvents like toluene, benzene, acetone etc; and at places hydrogen peroxide was also used for

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information from Director (Science) of the Chemistry Branch of the Survey.

removing the accretions and stains. It was then preserved with 3 per cent solution of polyvinyl acetate in toluene.

6. PAINTINGS IN RANG-MAHAL, RED FORT, DELHI.—During this year two arches on the southern side of the monuments were taken up for exposing the paintings under lime wash which was removed by using dilute acetic acid solution. The exposed paintings were cleaned with organic solvents like butyl alcohol, butyl lactate and cellosolve etc. The entire area was preserved with 3 per cent solution of polyvinyl acetate in toluene.

7. SAWAN PAVILION, RED FORT, DELHI.—The western and southern portions of this monument were chemically treated and preserved during this year. First, superficial accretions of dust, dirt, soot and greasy matters were removed by using 1 per cent aqueous solution of ammonia and teepol with nylon brushes while the hard stains were removed with the help of hydrogen-peroxide and organic solvents like xylene, toluene etc. Then the entire pavilion was preserved with 3 per cent solution of polyvinyl acetate in toluene.

8. SHAH BURJ, RED FORT, DELHI.—The eastern side of the Shah Burj has been chemically treated and preserved. As the area was covered with dust, dirt, greasy matter and soot deposits, dust and dirt were removed by soft paint brushes while other accretions were removed by the application of 1 to 2 per cent solution of ammonia and teepol in water. Afterwards the surface was preserved with 3 per cent solution of polyvinyl acetate in toluene.

9. WOOLLEN GARMENTS, PAINTINGS, STONE PILLARS OF INDIAN WAR MEMORIAL MUSEUM, RED FORT, DELHI.—The stone pillars covered with green paints were chemically treated by butyl lactate and 3 per cent solution of sodium hydroxide with brushing. Besides, the woollen garments like coats, trousers, turbans, caps etc., were chemically treated first by dry brushing and then by washing with petroleum ether. Torn portions of garments and fragile parts of caps were mended, using support clothes of the same type. These garments were subjected to fumigation with thymol and paradichlorobenzene vapours. Moreover, prints and water colour drawings were chemically treated by using organic solvents like carbontetrachloride, benzene etc.

10. PAINTINGS OF RAUSHANARA BARADARI, RAUSHANARA BAGH, DELHI.—The paintings were covered with very thick lime plasters which was removed by using chemico-mechanical methods treatment with 1 per cent of acetic acid and mechanical removal by soft spatula. Before the chemical treatment, the work of preservation and consolidation was completed.

11. NILA GUMBAJ, NIZAMUDDIN, NEW DELHI.—This year the treatment of paintings was taken up on the western and the northern sides of the central ceiling and the adjoining walls. The surface was covered with thick deposits of dust, dirt, cocoons, birds excreta and other layers of tarry matter and cobwebs. Superficial accretions were removed by using organic solvents like pyridine, butyl alcohol, diacetone alcohol etc. Afterwards the entire area was preserved with 3 per cent solution of polyvinyl acetate in toluene.

GOA, DAMAN AND DIU

12. CANVAS AND PANEL PAINTINGS IN CHURCHES, VELHA GOA, GOA.—Wooden panels and canvas paintings (pl. LVIII) were found to be covered with dust, dirt and thick deposits of old decomposed varnish and shellac. Some of the paintings were badly affected due to the presence of fungal growth. So the paintings were subjected to chemical treatment

with a number of organic solvents in suitable proportions. Some of the paintings were relined with wax-resin mixture and few wooden frames replaced and others repainted.

GUJARAT

13. RANI SIPRI'S MOSQUE AND TOMB, AHMADABAD, DISTRICT AHMADABAD.—Deposits of dust and dirt, smoke along with moss and lichen were successfully eliminated from the affected surfaces of the beautiful stone *jali* of the eastern wall of Rani Sipir's tomb. Ammonical water mixed with teepol was used for softening and cleaning extremely-resistant age-old accretions. The chemically-cleaned decorative *jali* was given a fungicidal treatment followed by two preservative coats of 3 per cent polyvinyl acetate solution in toluene.

14. DVARKADHIS TEMPLE, DWARKA, DISTRICT JAMNAGAR.—The northern side of the third storey of the Dvarkadhis temple was subjected to chemical treatment for the removal of thick lime plaster, moss, lichen and coating underneath the limewash on the small sculptures and carvings of the temple. The treatment was carried out successfully by softening the plaster and limewash with prolonged soaking in cotton swab of dilute acetic acid followed by mechanical technique. Moss and lichen had also been eradicated and the cleaned surfaces preserved with polyvinyl acetate solution in toluene after the application of fungicide with satisfactory results.

15. TAMBEKERWADA, VADODARA, DISTRICT VADODARA.—The paintings representing scenes from the *Ramayana* and *Krishna-lila* on the first floor at Tambekerwada have been subjected to chemical treatment and preservation. Flaking pigments have been fixed to the plaster and secured to the wall. The gap between the painted surface and the carrier caused by the erosion of the ground material was filled in by injecting fevicol with water. Previous coatings of preservatives from the paintings were removed and all accretions of dust, dirt and greasy matters deposited over the paintings were chemically cleaned by using organic solvents such as amyl acetate, benzene and methyl alcohol and their mixtures. The treated paintings which have been preserved are now bright and display all the original colours in their natural shades.

HIMACHAL PRADESH

16. LAKSHMINARAYANA TEMPLE, CHAMBA, DISTRICT CHAMBA.—The exterior of the congregation hall of the Lakshminarayana temple; which was covered with a thin layer of moss and lichen, was cleaned with nylon brushes and dilute ammonia solution. After drying, the area was given a fungicidal coat with zinc silico fluoride and it was finally preserved with 3 per cent polyvinyl acetate in toluene.

17. HIDAMBADEVI TEMPLE, MANALI, DISTRICT KULU.—The wooden carvings and the panels on the facade of Hidambadevi temple, Manali, which was covered with old paint varnish, smoke, greasy and oily matters and birds excreta, were chemically cleaned with organic solvents and reagents. Afterwards the treated area was preserved with 3 per cent polyvinyl acetate in toluene.

JAMMU AND KASHMIR

18. SHISH-MAHAL, RAMNAGAR, DISTRICT UDHAMPUR.—The paintings on the walls of Shish-mahal were chemically treated and preserved with 3 per cent solution of polyvinyl acetate in toluene.

KARNATAKA

19. TIPU SULTAN'S PALACE, BANGALORE, DISTRICT BANGALORE.—The mural paintings of Tipu Sultan's palace were in a bad state of preservation due to deposits of dust, dirt, greasy matter etc., and the old preservatives have darkened due to its decomposed state. The paintings have been spoilt by scratches, and further limewash deposits were also seen on them. The process of treatment involved the removal of superficial dust, dirt and greasy substance by means of chemicals like diacetone alcohol, cellosolve, methyl alcohol, ethyl alcohol, morpholine, butyl lactate, triethanol amine, toluene, turpentine etc. Finally a preservative coating of 3 per cent polyvinyl acetate in toluene was applied.

20. GOMMATESVARA STATUE, SRAVANABELGOLA, DISTRICT HASSAN.—The chemical treatment and preservation of inscribed slabs at the entrance of the Gommatesvara statue and carved pillars inscriptions of Chamundraya family and Siddhara Gundu was completed during this year. The places were covered with superficial layer of dust, dirt, soot and thick vegetational growth and oily accretions to such an extent that the intricate carvings and inscriptions were almost invisible to the naked eyes. The treatment involved dry brushing followed by application of wax polish on the surface, and then rubbing vigorously with polishing cloth. These treatments resulted in good appearance and heightening of details of inscription and intricate carvings.

21. MANDAPA OF CHATURMUKHA TEMPLE, KARKALA, DISTRICT NORTH KANARA.—The granite temple has been affected by vegetational growth besides the accretions of dust, dirt, soot, grease etc. It has been chemically cleaned and preserved.

22. GOMMATESVARA STATUE, KARKALA, DISTRICT SOUTH KANARA.—Considerable deterioration has taken place as a result of periodical heavy monsoon showers and other weathering effects. The superficial dust, dirt, greasy matter and vegetational growth had been removed by using suitable chemicals. The work is in progress.

KERALA

23. PAINTINGS IN SIVA TEMPLE, CHEMMANTHATTA, DISTRICT TRICHUR.—Consolidation of the ground was carried out by injecting plaster of Paris in water through the syringes to the carrier and pressing the ground till the required adhesion is obtained while consolidation of the pigments was done using polyvinyl acetate solution in toluene. The consolidated and the other painted areas were then treated with ethyl alcohol, benzene, triethanol amine and diacetone alcohol with turpentine as the retarder. The chemically-treated areas were then preserved using a 2 per cent polyvinyl acetate solution in toluene.

24. WOODEN BRACKET FIGURES AND CARVINGS IN VISHNU TEMPLE, KADAVALLUR, DISTRICT TRICHUR.—These wooden brackets were treated with a 10 per cent aqueous solution of teepol and ammonium hydroxide in the proportion of 1:3 followed by gentle brushing and flushing with copious water. As the sculptures are made of wood there is a need to eliminate the possibility of retention of water/moisture in the cavities and crevices. The sculptures were, therefore, repeatedly washed with ether alcohol and after drying, a coating of 2 per cent pentachlorophenol in benezene was applied as insecticide after which the sculptures and carvings were preserved with a 2 per cent polyvinyl acetate in toluene. The entire work as per the estimate was completed in the year under review.

25. PAINTINGS IN SANKARANARAYANA SHRINE, TRICHUR, DISTRICT TRICHUR.—The paintings were covered with a thick coating of soot and oily matter in addition to the superficial accretions. Chemical treatment was carried out for the removal of the above accretions with triethanol amine, morpholine, n-butyl alchohol, ethyl alcohol and toluene with turpentine as the restrainer. The chemicals were used individually or in combination depending upon the necessities of the situation. The sooty and oily accretions were thus removed and the paintings consequently brightened. Wherever lacunae existed in the painted ground they were suitably filled with plaster of Paris in water with the required consistency. The broken edges were similarly filleted using the same consolidant. The consolidated areas were then suitably reintegrated to merge with the paintings. The treated areas were finally preserved with a 2 per cent solution of polyvinyl acetate in toluene.

MADHYA PRADESH

26. KOTESVARA MAHADEVA TEMPLE, LANJI, DISTRICT BALAGHAT.—This temple was taken up for the removal of moss, lichen, fungus as well as thick layer of limewash to bring out the carvings to prominence. The limewash and the biological growth were eradicated with dilute acetic acid and dilute ammonia mixed with teepol. Fungicide used was santobrite and preservative was 3 per cent polyvinyl acetate in toluene.

27. VISHNU TEMPLE, JANJGIRI, DISTRICT BILASPUR.—The work was undertaken in this temple for the removal of moss and lichen and dried fungus. These were eradicated with ammonical water while the limewash coating was removed with dilute acetic acid. A new non-ionic product Edipol (of I.D.P.L., Hyderabad) was used. Several types of fungicides were utilized for testing their efficacy for long periods on limited areas. The new fungicides were benzal konium chloride, while for large area, santobrite has been used as it has been seen to be the most effective on the one face of the temple treated twenty years back. A 3 per cent P.V.A. solution in toluene has been applied as a preservative coat. Mending has been done of broken and cracked sculptures to avoid misplacement of vital parts. For instance, leg has been restored for supporting the standing figures and preventing it from falling down by the use of epoxy resin and fine powder of the same sandstone used for carving out the sculpture.

28. GROUP OF TEMPLES, KHAJURAHO, DISTRICT CHATTRAPUR.—This year the work on the Duladeva temple for the removal of moss and lichen as well as the limewash has been taken up. The work on the Chitragupta temple is in progress. New fungicides, benzal konium chloride, thirmersal, zinc silico fluoride in combination, have been tried on the marked areas. The preservation was done using polyvinyl acetate in toluene. The paper-pulp treatment was also carried out to extract the harmful soluble salts. Hard accretions inside the Chitragupta temple were softened by the use of suitable chemicals.

29. BAGH CAVES, BAGH, DISTRICT DHAR.—The work of stripping of paintings on the eastern wall of Cave 4 was immediately taken up as the seepage of moisture through the wall was causing fast decay and peeling off of the paintings. Three pieces of paintings, each measuring about a square meter, were detached skillfully using the Italian strappo technique. The pieces after stripping have been properly packed to acclamatize to the new weather conditions in the field laboratory room at the Bagh caves since inside the caves the paintings were continuously exposed to highly humid but static temperature environment. The mounting work will be resumed very shortly.

30. PAINTINGS AT SHAH TOMB, BURHANPUR, DISTRICT KHANDWA.—The work of consolidation of the flaking pigment as well as plaster layer was taken up. The bulging was overcome by filleting and adhesion of the ancient plaster with the use of metallic mesh and nails along with slurry of fevicol mixed with plaster of Paris. The filletted portion was then matched with the surroundings.

31. NILAKANTHESVARA TEMPLE, UDAIPUR, DISTRICT VIDISHA.—The work of chemical cleaning for removal of moss, lichen and fungus etc., was continued. Lime coating has been removed with dilute acetic acid solution. The preservative used is polyvinyl acetate in toluene.

MAHARASHTRA

32. BIBI-KA-MAQBARA, AURANGABAD, DISTRICT AURANGABAD.—The marble screen above the main tomb of Bibi-ka-Maqbara was covered with thick deposits of oily accretions by constant touch of visitors. As a result of depositions of dust, dirt, and other similar accretions the screen had become very dirty and ugly while the oily stains and accretions were attended to with the solvents like hydrogen peroxide; dust and dirt were cleaned with ammonia solution or mixture of ammonia and teepol. It was then preserved with 3 per cent polyvinyl acetate solution. The paintings executed on the lime plaster, in the room in which the office of the Horticultural Assistant is located, were also subjected to chemical treatment. Due to constant leakage of water, paintings were damaged badly and found covered with dust, dirt, mud, cement deposit etc. There was evidence of the fungal growth as well. These paintings were treated with suitable organic solution mixture. The fixing of the loose plaster is still to be carried out along with chemical treatment.

33. MONOLITHS, LALPETH, DISTRICT CHANDRAPUR.—The Lalpeth monoliths are lying in the open field and are exposed to all the vagaries of weather. These sculptures were found to be covered with thick deposits of moss and lichen all over along with the layer of dust, dirt etc. Some of these sculptures have developed minor cracks due to change of temperature and atmospheric conditions. Loose sculptures were consolidated and cracks filled up with epoxy resins with filler of same materials. Sculptures were cleaned with ammonia and teepol mixture. A 3 per cent zinc silicofluoride solution is used for fungicidal treatment and 3 per cent polyvinyl acetate solution as a preservative.

34. PANDULENA CAVES, NASIK, DISTRICT NASIK.—The appearance of the stone sculptures of the Cave 20 was found very dull and dark due to the accumulation of dirt, dust, soot, bat's excreta and other organic matter. As these accretions were not responding to the organic chemicals, mechanical methods were tried for their removal. Ammonia and its mixture with detergent were used to get the desired effects of the clean surface. Finally, the cleaned surface was given fungicidal treatment with 3 per cent solution of zinc silico-fluoride and 3 per cent solution of polyvinyl acetate for preserving the surface.

35. PAINTING IN SHANWARWADA, PUNE, DISTRICT PUNE.—The paintings on the south wall of the Delhi Gate at Shanwarwada were covered with limewash, varnish along with the layers of dust, dirt, bird's excreta and other similar types of accretions. These paintings were treated with organic solvents such as methylalcohol, acetone, 2-ethoxyethanol, butyl alcohol, diacetone alcohol etc., or in their suitable combinations depending upon the types of accretions. Lime-covered paintings were exposed very carefully with chemico-mechanical means. These paintings contain two or more than two layers of lime plaster. Modelling work was carried out to attend

the filleting, fixing of plaster, filling up of cracks and to set right the bulging portions along with the colour-matching of the filleted area.

36. SIVA TEMPLE, AMBERNATH, DISTRICT THANA.—The colour and texture of stone sculptures and carvings of the Siva temple, Ambernath had undergone a considerable physical change on account of thick deposits of dust, dirt, moss and lichen etc. Dilute ammonia and teepol combination had been found very effective to remove all these accretions. The clean surface was given a fungicidal treatment with 3 per cent zinc silicofluoride solution; 3 per cent polyvinyl acetate in toluene was applied to act as preservative.

ORISSA

37. NATMANDIR COMPLEX, SUN TEMPLE, KONARAK, DISTRICT PURI.—The accretions of moss, lichen and the superficial deposits were removed by using suitable detergents like teepol and ammonia in water with brushing. As a result, the sculptures, carvings and floral designs on the stone are presenting good appearance.

38. LORD JAGANNATH TEMPLE, PURI, DISTRICT PURL—The coat of the lime over the carved panels was subjected to the chemical treatment with dilute solution of acetic acid followed by thorough washing with water. After removal of the lime-coat the original colour of the parent rock has come out.

RAJASTHAN

39. JAWAHAR BURJ, BHARATPUR, DISTRICT BHARATPUR.—The broken edges and cracks were filleted by the Modeller. After the completion of the filleted work, the area was made to match with the surroundings. Afterwards the area was preserved by the application of polyvinyl acetate 3 per cent in toluene.

40. MARBLE JHOOLA, DEEG PALACE, DEEG, DISTRICT BHARATPUR.—The marble *jhoola* was covered with patches of vegetational growth and yellow coloured deposits. The vegetational growth was removed by using 2 per cent solution of ammonia and teepol in water and yellow deposits with chemico-mechanical methods. Afterwards the area was preserved with 3 per cent P.V.A. in toluene.

41. NAND-BHAWAN, DEEG PALACE, DEEG, DISTRICT BHARATPUR.—The paintings on the pillars of this monument were covered with thick layers of dust, dirt and greasy matter. The paintings were treated with organic solvents like methyl alcohol, acetone, triethanolamine, butyl lactate etc., for the removal of thick accretions by means of cotton swabs. Afterwards the entire area was preserved with 3 per cent solution of polyvinyl acetate in toluene.

TAMIL NADU

42. KAILASANATHA TEMPLE, KANCHIPURAM, DISTRICT CHINGLEPUT.—Chemical treatment for the eradication of vegetational growth from the entire area has been completed. Extraction of soluble salts, removal of limewash, fungicidal treatment and preservation remained to be carried out which will be undertaken after the completion of conservation work that aims at the removal of accretionary lime plaster wherever found necessary to expose the original stone carvings.

43. ARJUNA'S PENANCE, MAHABALIPURAM, DISTRICT CHINGLEPUT.—The part of Arjuna's penance near the dexter base was found covered with thick vegetational growth which was marring the appearance of the entire panel of the Arjuna's penance. These accretions were therefore removed using an aqueous solution of a mixture of teepol and ammonium hydroxide. The treated area was then preserved with 2 per cent polyvinyl acetate in toluene.

44. SHORE TEMPLE, MAHABALIPURAM, DISTRICT CHINGLEPUT.—This temple was treated for eradication of vegetational growth using aqueous solution of a mixture of teepol and ammonium hydroxide.

45. PAINTINGS, CHENNARAYAPERUMAL TEMPLE, ADIYAMANKOTTAI, DISTRICT DHARMAPURI.—The work of consolidation, using plaster of Paris, and that of loose and flaked pigments using a 5 per cent solution of polyvinyl acetate in toluene by spraying had been carried out. The paintings were then treated with ethyl alcohol and toluene and final preservation was carried out by using 2 per cent polyvinyl acetate in toluene.

46. BRIHADISVARA TEMPLE, THANJAVUR, DISTRICT THANJAVUR.—During the year under review walls of all the chambers up to a height of 2 m above the floor-level, were thoroughly tested and consolidation work carried out wherever found necessary. The plaster of Paris in water either in the form of paste or as a solution, depending upon the necessities of the situation, was used. The consolidation of the pigments to the ground was done by the use of 3 per cent polyvinyl acetate in toluene.

In the chambers of the circumambulatory passage of the Brihadisvara temple, two layers of paintings exist now in certain chambers; the earlier, belonging to the times of the Cholas, was executed on the rock of the walls of the chambers in lime-plaster ground whereas the later one, of the period of the Nayakas, are found superimposed over the former. Interestingly, even the Nayaka paintings have lime-plaster ground. For separating these two layers of murals by detaching the Nayaka stratum, leaving the Chola paintings *in situ,* strappo (Italian) process followed by mounting on suitable plastics reinforced with glass-fibre is going to be effected in Chamber 10.

The Marhatta paintings in the Subramanya shrine in the same temple complex are in the form of panels and are executed mostly on plastered wall; however, a couple of panels are on the lime-primed stone. The work involved treatment of paintings for brightening up, consolidation of flaked pigments to the ground and curled paintings on paper, including the fixing of bulged plaster to the carrier and the final preservation. A 5 per cent polyvinyl acetate in toluene was sprayed and pressed to the ground for the consolidation of pigments and curled paper paintings. Bulging in the plastered ground were consolidated using plaster of Paris in water. The paintings were then chemically treated using toluene, ethyl alcohol and diacetone alcohol with turpentine. The consolidated areas were suitably reintegrated. Then the entire area was preserved with a 2 per cent solution of polyvinyl acetate in toluene.

UTTAR PRADESH

47. DOME OF CHINI-KA-ROUZA, AGRA, DISTRICT AGRA.—The dome of Chini-ka-rouza is a beautiful structure containing tiles in geometrical designs in different colours. It was covered with thick layer of dense moss and lichen and growth of bushes which had hidden its beauty. The chemical treatment was carried out with ammonical solution with soft nylon brushes and cotton. After fungicidal treatment the entire dome has been preserved.

48. MARBLE CLEANING IN MAIN ENTRANCE HALL OF JAMA MASJID, AGRA, DISTRICT AGRA.—This work was taken up in 1980-81 for the removal of dust, dirt, smoke and grease with the help of suitable organic solvents and non-ionic detergents with cotton swabs and soft nylon brushes. After completion of chemical treatment the marble surface is giving attractive appearance.

49. SAHELI BURJ OUTSIDE TAJ MAHAL, AGRA, DISTRICT AGRA.—The structure and the carvings on the exterior were covered with thick layers of moss and lichen, bushes, dirt, dust and other accretions. The original surface of the facade of this huge structure has now been brought out with chemical treatment and preservation with the help of suitable soft nylon brushes and mixture of ammonical solution in water.

50. CLEANING OF LOWER BORDER AND MARBLE JALI ON EXTERIOR OF WESTERN BIG ARCH, TAJ MAHAL, AGRA, DISTRICT AGRA.—The lower border and marble *jali* on the exterior of the big western arch in the Taj Mahal was covered with dust, dirt and other accretions. Effects of smoke as also of grease due to constant touch of the visitors were also there. These have been removed with suitable mixture of organic solvents. Now this surface and the *marble jali* are showing their original appearance.

51. OUTER WALL OF TAJ MAHAL, AGRA, DISTRICT AGRA.—The entire outer wall covered with dust, dirt, moss, lichen and smoke had hidden the original beauty of this work of art. This was given chemical treatment and preserved with suitable solvent with soft nylon brushes.

52. MARY AM PALACE (EXTERIOR), FATEHPUR SIKRI, DISTRICT AGRA.—The exterior of Maryam palace, Fatehpur Sikri, Agra is having structural beauty and carving on the four side railings and there is a beautiful structure of dome on the top of Maryam palace. This beauty of the work of art was covered with the thick layer of moss, lichen, dust and dirt. This was removed by chemical treatment with suitable ammonical solution water and other suitable detergents with the soft nylon brushes. After repeated application of chemical treatment the original beauty of work of art has come out. This treated surface has been given fungicidal spray and later on this was preserved.

53. PAINTINGS IN BARADARI, RAM BAGH, DISTRICT AGRA.—The ceiling and side wall as well as borders were also covered with the thick coating of lime. This thick layer coating of lime was removed with great care with suitable instruments and organic solvents. After the complete removal of lime plaster, angels and beautiful paintings of the Babar period showing birds, human figures and geometrical designs in different colours like red, yellow, blue, orange, green have been exposed. These paintings have been given chemical treatment for the removal of accretions of dust, dirt and lime with suitable mixture of organic solvents. After treatment these paintings have been preserved with the solution of polyvinyl acetate in toluene 1 per cent. Now these paintings look like the original work of art of Babar's period.

WEST BENGAL

54. LALJEE TEMPLE, BISHNUPUR, DISTRICT BANKURA.—Accretions of dust, dirt and vegetational growth on the wall of this temple have been chemically removed and preserved with polyvinyl acetate.

55. RADHESHYAM TEMPLE, BISHNUPUR, DISTRICT BANKURA.—The coats of dust, dirt and the vegetational growth have been chemically cleaned and preserved.

TREATMENT OF EXCAVATED OBJECTS AND MUSEUM EXHIBITS[1]

56. Sixteen prints were received from the Deputy Superintending Archaeologist for Museums, Southern Region, Madras for the purpose of treatment in the Zonal Laboratory, Hyderabad. Almost all the prints received were covered with fly marks and were appearing brownish. In addition, there were superficial accretions of dust and dirt associated with their storage. The mounts were carefully detached from the prints and separated. Thereafter the prints were washed with water for the removal of the superficial accretions. They were then immersed in a mixture of an aqueous 2 per cent solution of sodium hypocholorite and formaldehyde for a very short duration. When all the accretions were removed the prints were cleaned to expose their original colour. They were then thoroughly washed repeatedly in tap water followed by a few washing in distilled water. These prints were finally dried in shade under weight.

57. The sculptures in marble, besides plaques and brass plates, in the St. Mary's Church Fort St. George, Madras, were chemically treated by the Zonal Laboratory, Madras. The work involved removal of stains and greasy matter, extraction of soluble salts from the salt-affected marble sculptures and final preservation. For the removal of stains 2 per cent aqueous solution of chloramine-T and 10 per cent hydrogen peroxide were used. The panels were then treated with an aqueous solution of ammonium hydroxide and teepol for eradication of greasy matter. Whenever found necessary repeated application of salt-free paper pulp in distilled water was given for the extraction of soluble salts and by this process maximum quantity of salts were removed. The treated area was then preserved with 2 per cent solution of polyvinyl acetate in toluene.

58. The Chemistry Branch Laboratory, Dehra Dun, chemically treated and preserved ten paper paintings from the Indore Museum, Madhya Pradesh. The paintings were very fragile showing flaking tendency. First the colours of the paintings were fixed with 0.5 perspex solution in toluene. The paintings were chemically treated and stains removed by applying different types of solvents, such as toluene, acetone, xylene, ethylene di-chloride etc. The superficial and waste paper from the back of the painting was also removed and finally they were thoroughly cleaned and mounted on Napalese tissue paper with *maida* paste, as an adhesive, with insecticide.

59. The antiquities (silver 28, copper 91, lead 1, iron 102 and *ashtadhatu* 11) from Sringaverpur excavations were chemically treated and preserved.

60. The studies in the air pollution is continuing. The SO_2 concentration is being measured by the PbO_2 method and the particulate matter by the dust-fall measurement technique. The climatological features like wind speed and direction, rainfall, relative humidity and tempera ture are being regularly recorded. Apart from these, experiments and research with different preservatives are also continuing.

61. The beautiful terracotta plaques and decorated motifs of the Raj Rajesvara temple at Dwarhatta, Nanda Dulal temple at Gurap and the Durga temple at Bally Dewangunj, all situated in District Hooghly, as also those of the temples of Santinath Siva at Chandrakona

[1]Chemical treatment carried out by: 56 to 59 Archaeological Survey of India; 61 Department of Archaeology, West Bengal; 62 Department of Archaeology and Museums, Madhya Pradesh; and 63 to 66 Department of Archaeology and Museums, Rajasthan.

(Mitrasenpur) and Radha Gobinda and Radha Raman Jew at Gobindnagar in District of Midnapur and the temple of Kashinath Siva at Ajhapur in District Burdwan were affected with fungicidal growths, injurious salts and covered with some undesirable stains. The fungicidal growths had been eliminated by 5 per cent liq. ammonia and 5 per cent tri-ethand aminc solution. The terracottas were thoroughly washed till these were freed of injurious salts. The undesirable stains were removed by the application of aromatic solvents like acetone, benzene, toluene and amyl acetate. After complete drying, the fungicidal treatment was followed by a coat of preservative solutions of 3 per cent vinyl acetate on beautiful terracottas which mainly depict scenes from the *Ramayana* and the *Puranic* episodes.

62. The chemical cleaning of the antiquities recovered from the excavated sites at Nandur, District Raisen, Runija, District Ujjain and Pagara, District Dhar, besides a large number of coins, copper-plates and sculptures acquired by various museums, including the sculptures from Hinglajgarh, was carried out.

63. Ten copper axes belonging to Ganeshwar, a well-known Copper Age site, were subjected to chemical clearing. These were found to possess indentation marks, which were made clear as a result of chemical cleaning.

64. Four hundred ancient coins were chemically cleaned and preserved by a suitable preservation coating.

65. Ancient survey maps numbering sixty-two were provided with backing cloth using synthetic resin as pasting material. Fifteen old and fragile books were provided with preservation treatment by a suitable binding covers.

66. A new relining of silk was given to an embroidered silken piece showing sun and moon made in golden wires.

XI. ARCHAEOLOGICAL GARDENS[1]

ANDHRA PRADESH

1. ARCHAEOLOGICAL MUSEUM, NAGARJUNAKONDA, DISTRICT GUNTUR.—The portion facing M.I.G. Rest House on the hill top was taken up for jungle and debris clearance. The cleaned surface was filled up with silt and earth before planting selected varieties of plants such as *Ageratum, Alysum, Candytuft, Calendula, Garllardia, Nasturttum, Petunia, Portulaca, Phlox, Verbena, Zinnialineoris, Linaria, Agave, Opuntia, Bryophyllum, Euphorbia, Yucca,* etc. Besides, other varieties of plants such as *Crossandra, Tecoma, Tantana, Punka, Murry, Cacti, Amarallis* etc. were also introduced in the garden to suit the surroundings.

2. ARCHAEOLOGICAL MUSEUM, AMARAVATI, DISTRICT GUNTUR.—The garden around the Museum was maintained in a befitting manner.

3. GARDEN, NAGINABAGH (GOLCONDA), DISTRICT HYDERABAD.—The Naginabagh garden was maintained satisfactorily.

BIHAR

4. ANCIENT REMAINS AND ARCHAEOLOGICAL MUSEUM, NALANDA, DISTRICT NALANDA.—The gardens around the ancient remains and the Museum were maintained in a presentable way.

5. MAURYA PALACE GARDEN, KUMRAHAR, DISTRICT PATNA.—The garden around the palace area was kept in a presentable state.

6. SHER SHAH'S TOMB, SASARAM, DISTRICT SASARAM.—The garden was maintained satisfactorily.

DELHI

7. HUMAYUN'S TOMB, NEW DELHI.—The Bengali Peer area outside the periphery wall of the tomb was landscaped, and arrangements of water supply system were also made effective to feed the area. Plants sacred to the Muslims were also introduced in the garden. A vertical turbine pump to meet the water scarcity of the area was also installed.

8. NAJAF KHAN'S TOMB, NEW DELHI.—A pumping set was installed in the bore-well to meet the scarcity of water for the maintenance of the garden around the tomb.

9. PURANA QILA, NEW DELHI.—The garden inside the Qila was provided with a vertical turbine pump-set, besides returfing some of the lawns.

10. QUTB GARDEN, NEW DELHI.—For effective water supply to the garden, layout was prepared and aluminium pipelines are to be laid.

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information from Chief Horticulturist of the Survey which maintains nearly 90 Archaeological gardens. Important works carried out during the year under review are included here. Information on item no. 21 received from the Director, Archaeology and Museums, Government of Madhya Pradesh.

Besides, the gardeas around Hauz Khas, Jantar Mantar, Kotla Firoz Shah, Lodhi tomb, Safdarjung's tomb etc. were also maintained in a befitting manner.

GOA, DAMAN AND DIU

11. ARCHAEOLOGICAL AREA, VEHLA GOA, GOA.—Some modifications were done to the underground pump-houses constructed earlier for playing and lighting the fountains, as these were getting flooded during rainy seasons. Some new types of trees, such as *Facronda, Mimosaefolia, Delomixregia* and *Spathodea Companulala* were also introduced in the garden opposite the St. Cathedral church.

GUJARAT

12. JAMIA MOSQUE, PAVAGARH, DISTRICT PANCH MAHALS.—The surrounding areas of the mosque had been landscaped.

13. HAZIRA TOMB, VADODARA, DISTRICT VADODARA.—To develop the area into a garden around the tomb, a scheme had been formulated and preliminary operations taken up.

HIMACHAL PRADESH

14. SIVA TEMPLE, BAIJNATH, DISTRICT KANGRA.—During the year under review, the garden operation was completed and new plants like *Aeglemarmelous, Bad, Datura, Bauhinia, Acuminata, Eravatami, Aspera, Ocumum basilicam, Nerium indicam,* etc., were introduced in the garden, besides arranging adequate water supply system.

JAMMU AND KASHMIR

15. SUN TEMPLE, MARTAND, DISTRICT ANANTANAG.—The garden around the temple was maintained in a presentable manner.

16. SANKAR-GAURISVARA TEMPLE, DISTRICT BARAMULLA.—The garden was kept in the best possible manner.

KARNATAKA

17. GARDEN AROUND ARCHAEOLOGICAL MUSEUM, HAMPI, DISTRICT BELLARY.—Submersible pump-set was installed in the bore-well to feed the garden attached to the Museum. Horticultural operation around the Vithala temple is in progress.

18. GROUP OF MONUMENTS, SRIRANGAPATNA, DISTRICT MANDYA.—The work of returfing was taken up in some of the lawns of the gardens around Daria Daulat and Gumbad-e-Shahi, apart from maintaining satisfactorily the garden around Narasimhasvami temple.

MADHYA PRADESH

19. GROUP OF TEMPLES, KHAJURAHO, DISTRICT CHHATARPUR.—The lawns attached to the western group of temples were returfed and sacred varieties of trees wherever necessary planted.

20. GARDEN AROUND HAMAM AND FORT, BURHANPUR, DISTRICT KHANDWA.—The garden attached to the monuments was maintained satisfactorily.

21. ISLAMNAGAR PALACE, BHOPAL, DISTRICT RAISEN.—With the addition of new lawns, the garden was further improved. Further, the ancient fountains were put to use and lighting arrangements revived.

MAHARASHTRA

22. BIBI-KA-MAQBARA, AURANGABAD, DISTRICT AURANGABAD.—The garden in and around the monument was maintained satisfactorily.

23. SHANWARWADA, PUNE, DISTRICT PUNE.—The garden'within the precincts of the monument was kept in a proper condition.

ORISSA

24. GROUP OF TEMPLES, BHUBANESWAR, DISTRICT PURL—The gardens around Bhaskaresvara, Chitrakami, Muktesvara, Raja Rani and Ramesvara temples were maintained well. The propagational activities of the nursury at Santrapur had been intensified.

25. SUN TEMPLE, KORARAK, DISTRICT PURL—During the year under review, a scheme had been formulated to drain off water from the low-lying areas around the monument. The newly-acquired area with sand-dunes is being taken up for landscaping.

26. LORD JAGANNATH TEMPLE, PURI, DISTRICT PURL—With the installation of a submersible pump-set, the water scarcity at the Neelanchal Upavanas has been minimized.

RAJASTHAN

27. ANNASAGAR BARADARI, AJMER, DISTRICT AJMER.—An electric motor pump-set was installed during the year.

28. DEEG PALACE, DEEG, DISTRICT BHARATPUR.—The garden around the place was maintained well. The orchard in Kacha-bagh had further been enriched with the addition of commercial varieties of fruit plants.

29. FORT, BHARATPUR, DISTRICT BHARATPUR.—Further steps were undertaken to enlarge the garden by removing the vegetational and other external growths, and a detailed survey of one sector of the fort was also taken up and completed.

30. PADMANI PALACE, CHITTAURGARH, DISTRICT CHATTAURGARH.—The garden around the palace was maintained satisfactorily. The water supply system entrusted to the CPWD had almost been completed. Systematic survey for landscaping around Bahama Shah palace, Victory tower etc., has heen undertaken.

UTTAR PRADESH

31. FORT, AGRA, DISTRICT AGRA.—The pipelines which were eroded and choked up were replaced by new P.V.C. pipelines. The shrubberies, opposite Akbari-mahal, were removed and hidden foundation of the *mahal* was exposed.

32. KHAN-I-ALAM NURSERY, AGRA, DISTRICT AGRA.—Steps were taken up to raise the humidity for quick rooting of the cuttings by introducing sprinkler system of irrigation in the green houses. The gardens around Akbar's tomb, Itmad-ud-Daula's tomb, Idgah, Marium's tomb and Roman Catholic cemetery were properly maintained.

33. RAMBAGH, AGRA, DISTRICT AGRA.—Systematic excavations were carried out to expose the hidden structures. Further work is in progress.

34. TAJ MAHAL, AGRA, DISTRICT AGRA.—New lawns of the Mahal were put under perfo-system of irrigation which had work effectively. The infected plots were returfed and shurbbcries removed.

35. LORD CORNWALLIS'S TOMB, GAZIPUR, DISTRICT GAZIPUR.—Steps were taken up to sink a bore-well in the existing well for augmenting water supply. Apart from this, some of the plots had been grassed.

36. ARCHAEOLOGICAL AREA, MAHET, DISTRICT GONDA.—The area taken up for horticulture-operations was fenced, besides completing the installations of turbine pump and tube-well, as worked out by the CPWD.

37. GANGADHAR ROA'S CHHATRI, JHANSI, DISTRICT JHANSI.—Horticulture-operation of the garden was completed and brought to the maintenance stage.

38. RESIDENCY GARDEN, LUCKNOW, DISTRICT LUCKNOW.—The garden around Bad-te-Kadam was returfed and effective water supply to the plants in the garden ensured.

XII. PUBLICATIONS

PUBLICATIONS OF THE SURVEY

1. INDIAN ARCHAEOLOGY—A REVIEW.—Two issues, one for the year 1976-77 and the other for 1977-78, were brought out.

2. ARCHITECTURAL SURVEY OF TEMPLES.—The *Cave Temples of the Deccan* by K. V. Soundara Rajan was published as the third number of this series.

3. ARCHAEOLOGICAL WORKS CODE.—The Hindi version of the Code has been printed off.

4. EPIGRAPHIA INDICA.—Parts IV and V of the volume XL have been sent to press. As a part of the reprinting programme of the Survey, volume VI of *Epigraphia Indica* has been printed off while volume VIII is now in the press.

5. EPIGRAPHIA INDICA—ARABIC AND PERSIAN SUPPLEMENT.—The issue for the year 1973 was published and the one for 1974 has been sent to press.

6. CORPUS INSCRIPTIONUM INDICARUM.—*The Inscriptions of the Early Guptas* is in final stage of printing. This is a revised edition of the volume III of the series.

7. ANNUAL REPORT ON INDIAN EPIGRAPHY.—The issue for the 1967-68 and 1971-72 have been brought out.

8. GUIDE BOOKS.—*Archaeological Museum, Khajuraho* (second edition) by Krishna Deva and B. S. Nayal, *Samath* (third edition) by V. S. Agrawal and *Ahmadabad* by K. V. Soundara Rajan were brought out.

9. PICTURE POSTCARDS.—Ten cards each of Ajanta and Agra in colour and Sravanabelgola in black and white have been printed.

OTHER PUBLICATIONS

ANDHRA PRADESH.—The Department of Archaeology and Museum, Government of Andhra Pradesh published : (i) *New Satavahana Sculptures from Amaravati,* part III of Andhra Pradesh : (ii) *Cuddapah District Inscription:* (iii) *A Monograph on Somapalem Temple, Chittor District;* and (iv) volume II of the *History of Medieval Deccan.*

ARUNACHAL PRADESH.—*Archaeology of Arunachal Pradesh* was sent to press by the Directorate of Research (History), Government of Arunachal Pradesh.

HIMACHAL PRADESH.—The Department of Language and Culture, Government of Himachal Pradesh printed (i) *Himachal Art and Archaeology—Some Aspects* and the (ii) *Exhibition on Mother Goddess—Introduction and Catalogue.*

MADHYA PRADESH.—The Department of Archaeology and Museums, Government of Madhya Pradesh, published (i) *A Catalogue on Saiva and Sakta Pratimayen,* (ii) folder on *Children through the Ages in Madhya Pradesh* (iii) one pamphelet each on *Madhya Pradesh at a Glance* and (iv) *Jaina Art in Madhya Pradesh,* besides the publication of (v) *An Archaeological Calender.*



Ramapuram: copper objects, Period I C. *See p. 7*

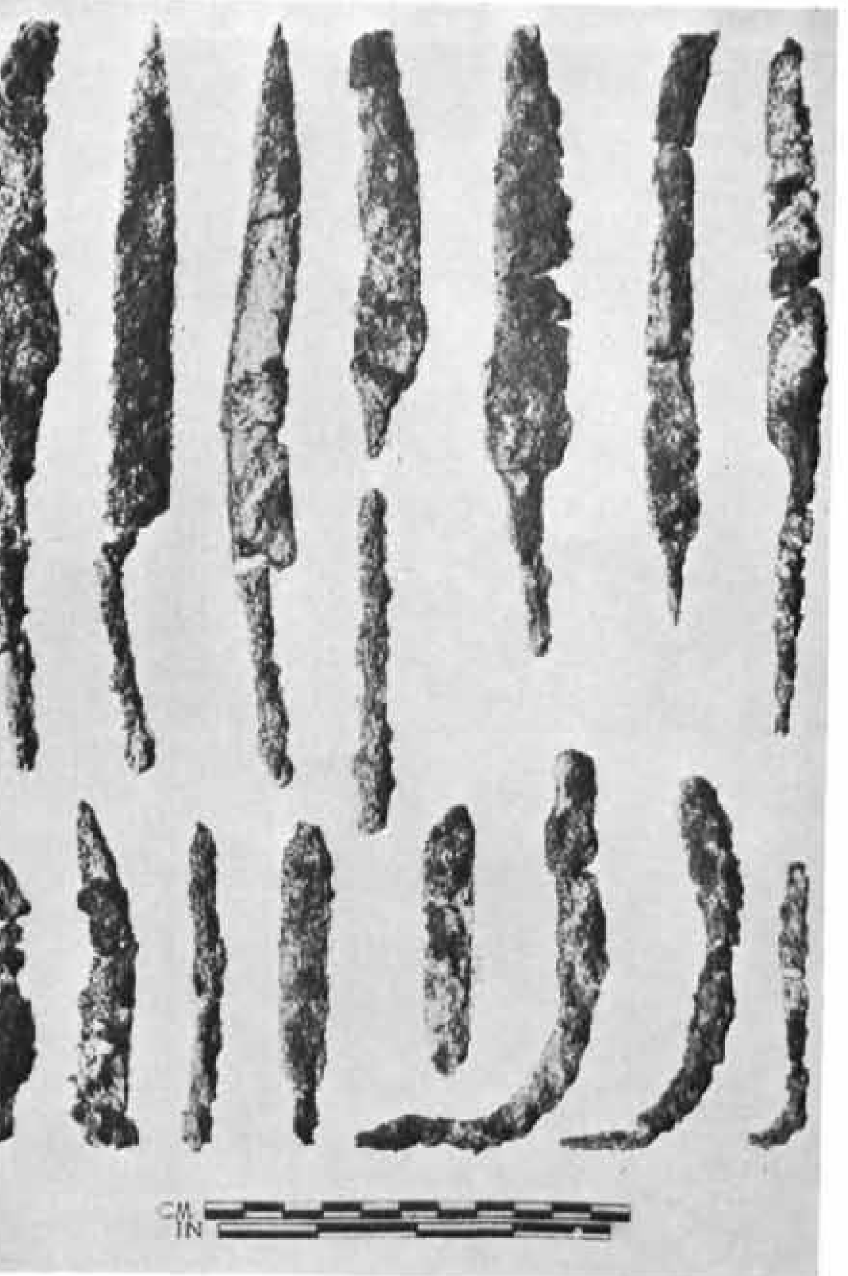


A

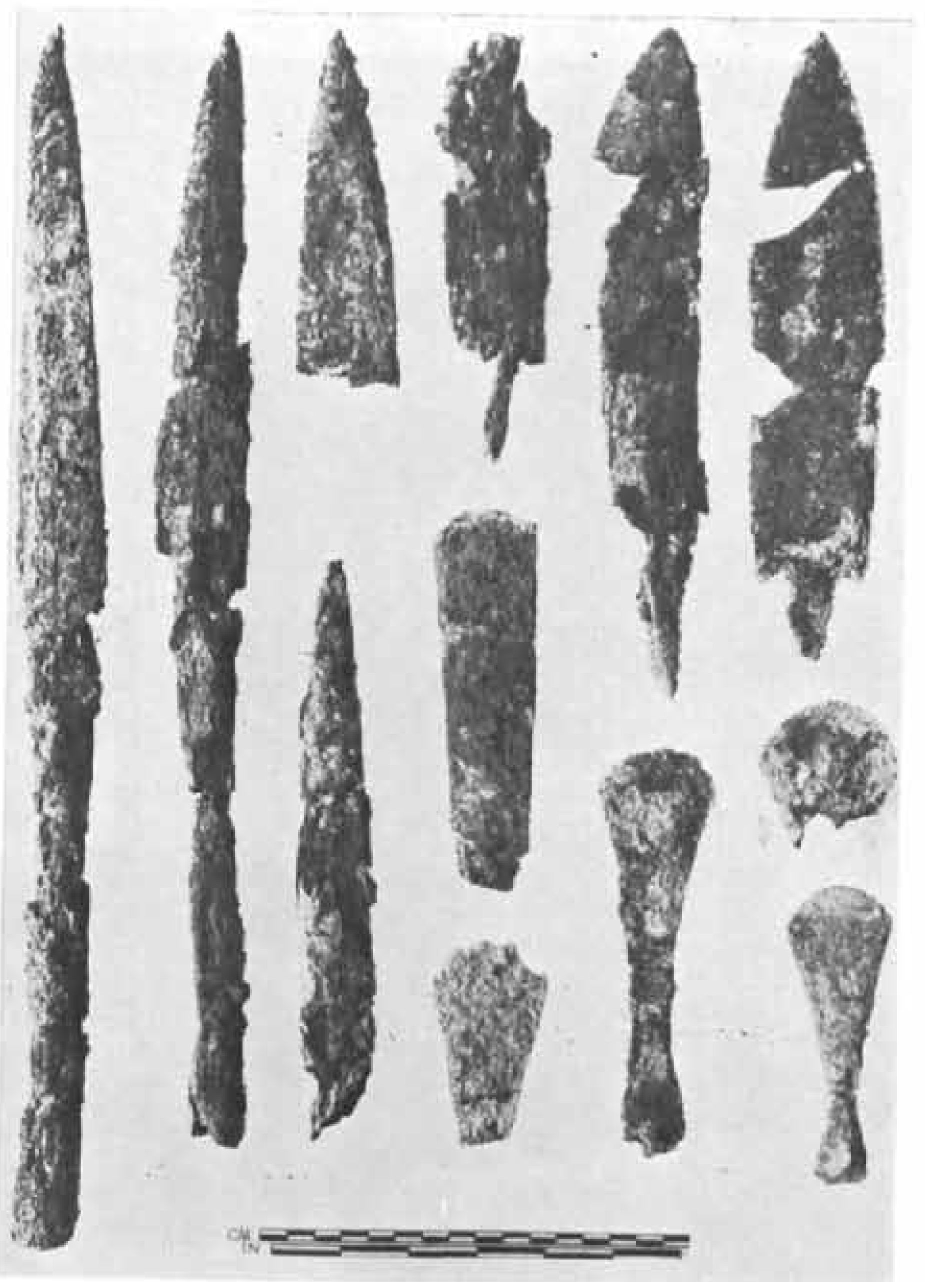


B

Ramapuram: general view of house-plans. *See p. 7*

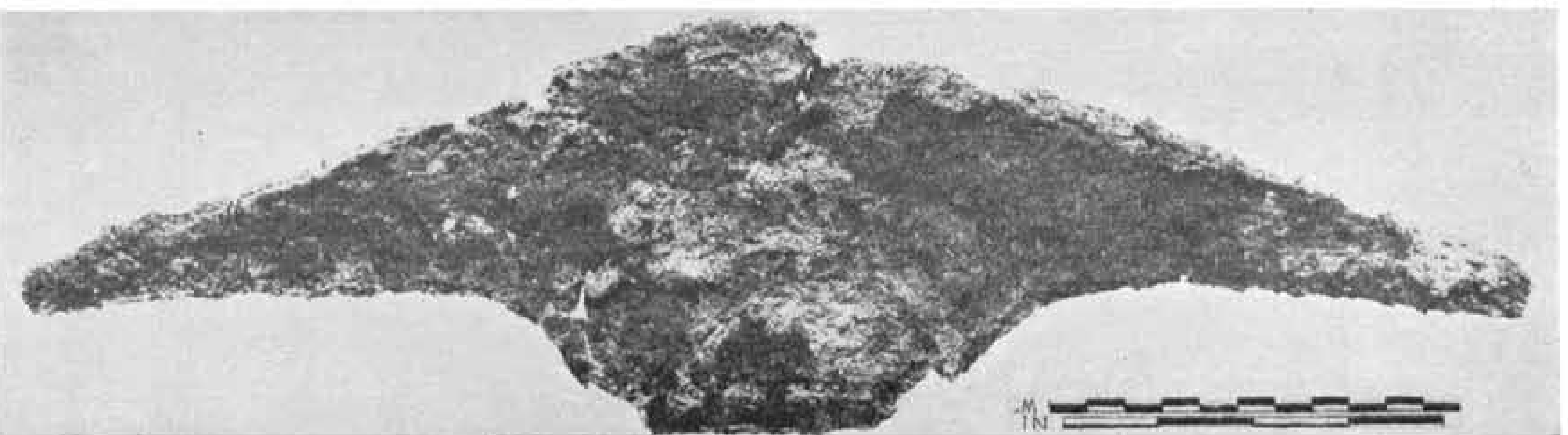


A

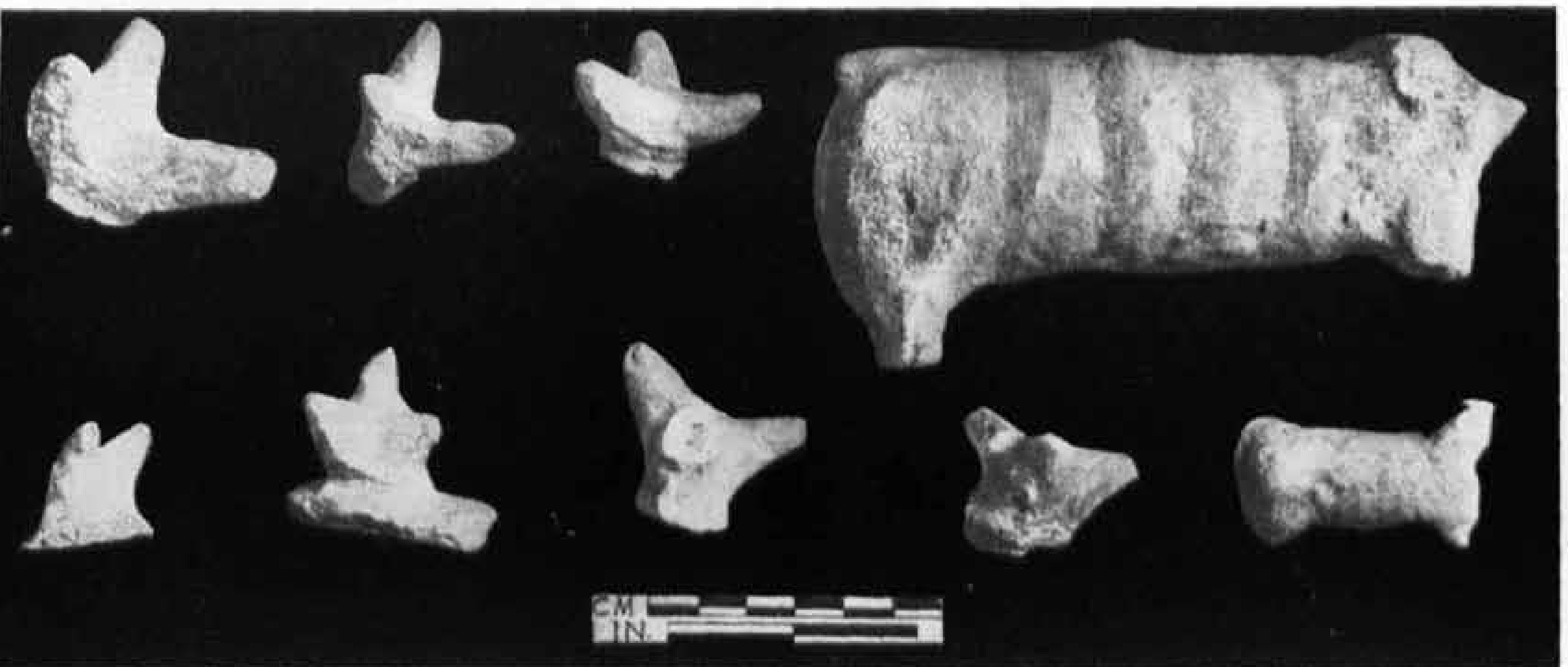


B

Ramapuram: iron implements from burials. *See p. 7*

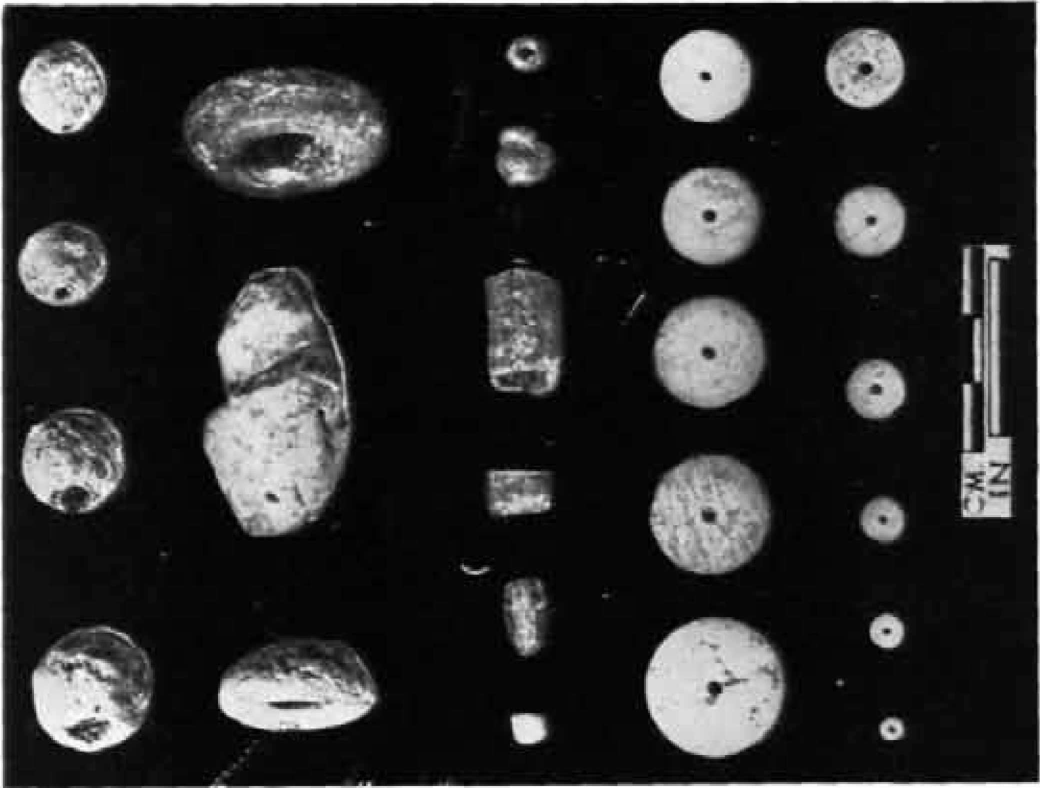


A



B

Ramapuram: A, *Iron implement from a cist;* B, *terracotta animal figurines.* *See p.* 7



B



A

Ramapuram: A, bone objects; B, beads. *See p. 7*



A

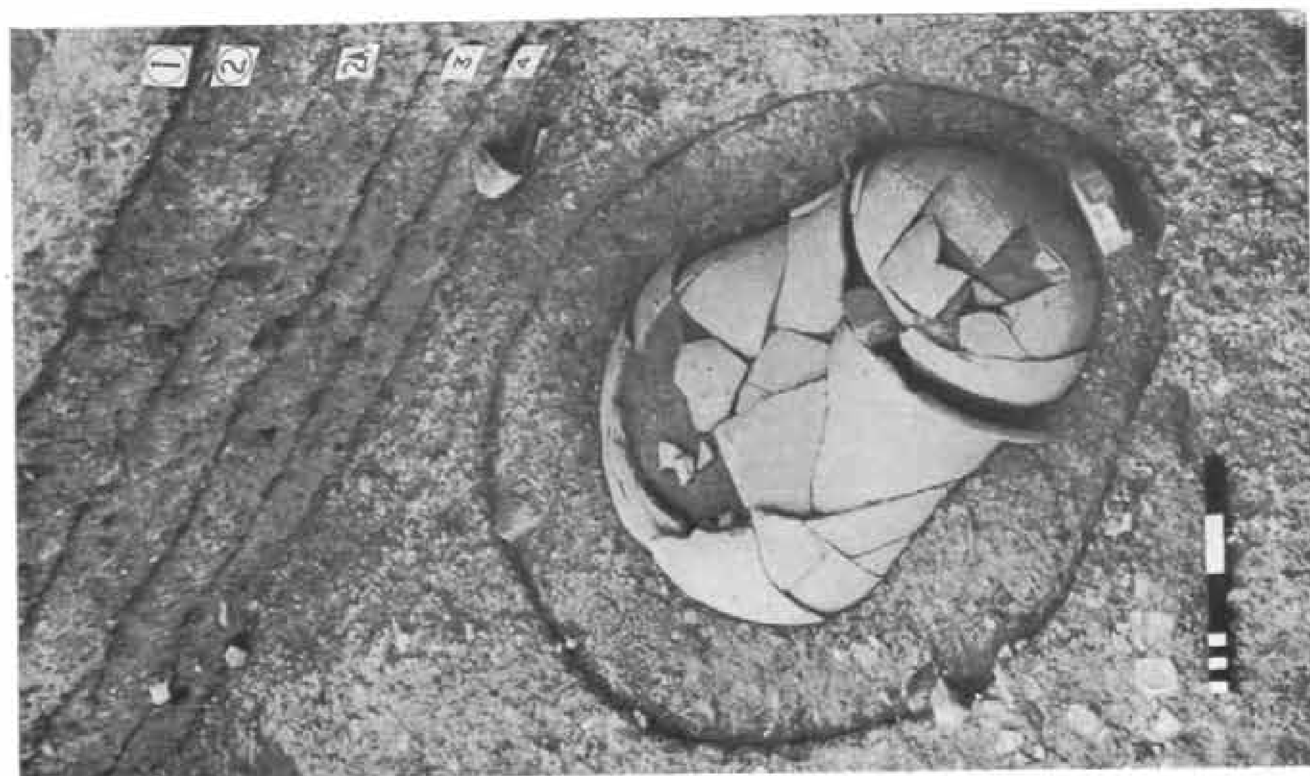


B

Ramapuram: A, *pit-burial*; B, *burial showing cairn packing*. *See p. 7*



B

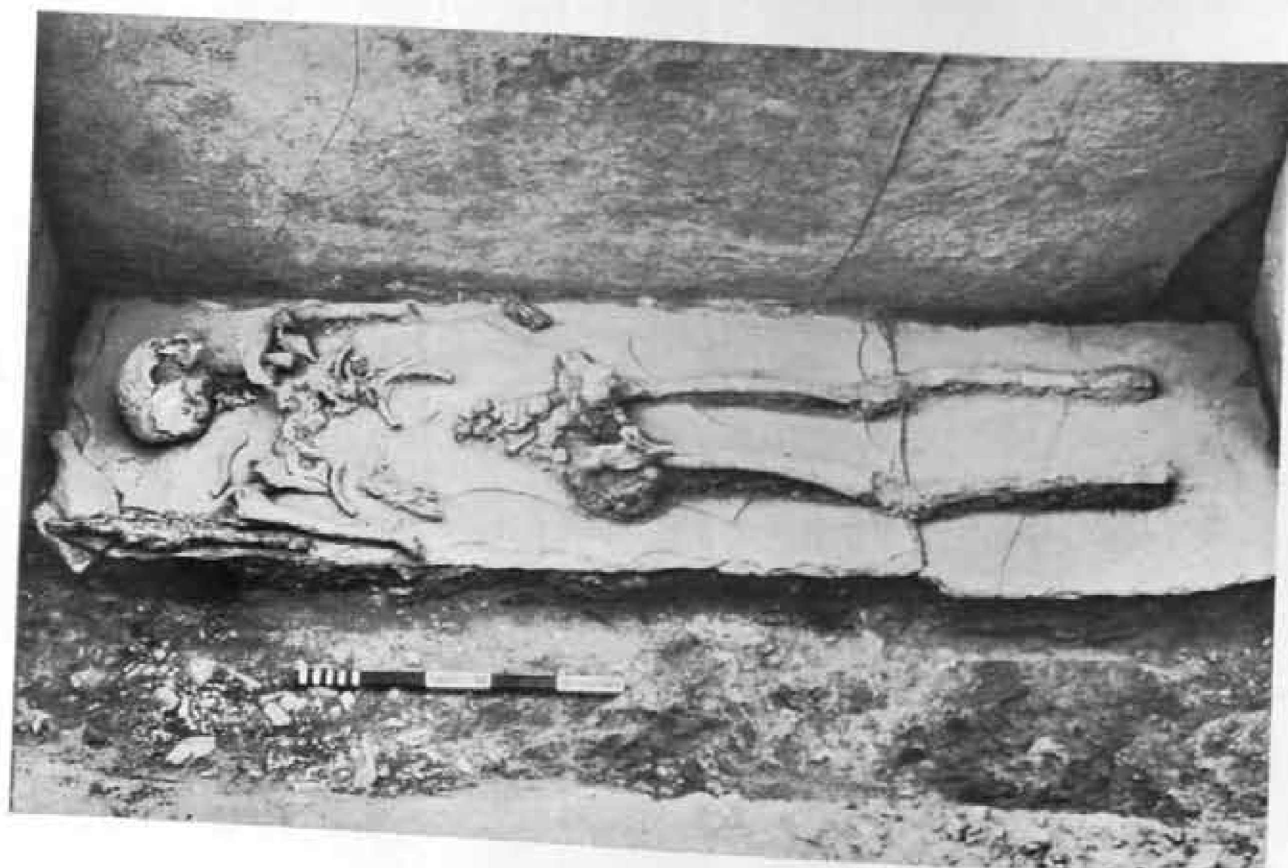


A

Ramapuram: A, double urn-burial; and B, its skeletal remains. *See p. 7*



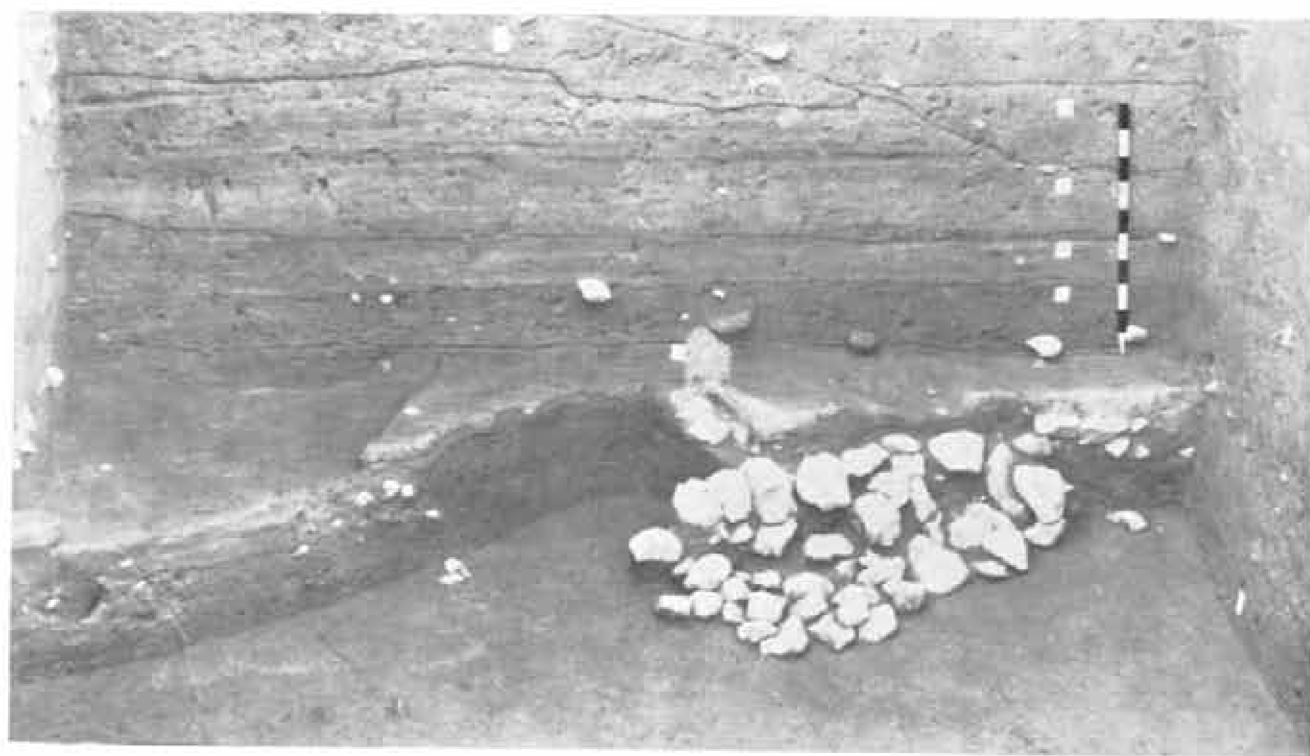
A



B



A



B

A, *Aphsad: part of temple remains*; B, *Semthan: exposed rubble wall.* *See pp. 9 and 21*



A



B

Pabumath: exposed stone wall. *See p. 14*



B



C

A

Semthan: A, pottery-types, Period I; B, coins; C, clay sealings, Period IV. See p. 21



C



B



A

Senthan: terracotta human figurines, surface collection. *See p. 21*



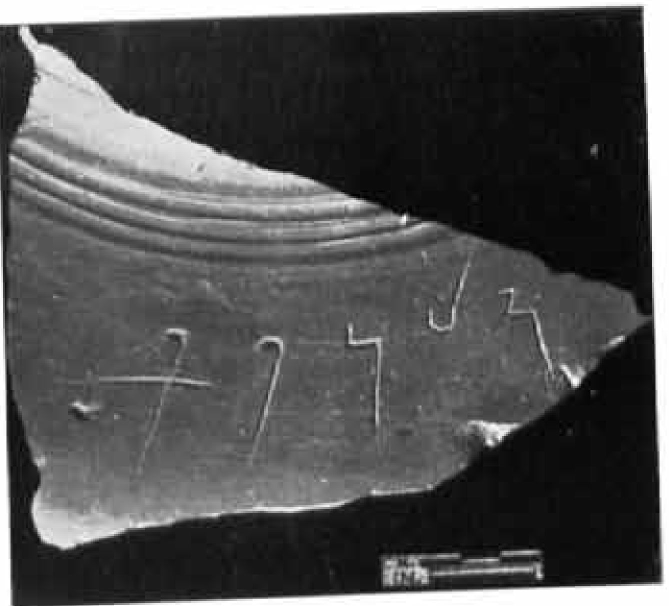
A



C



E



B



D

Semthan: A, sealing; B, inscribed potsherd; C-E, terracotta figurines. *See p. 21*



A



B



A



B

Hampi: A, structural phases in King's Audience Hall; B, drain, soak-pit and a living room. *See p. 27*



A



B

Hampi: excavated structural remains. *See p. 27*



Hampi: excavated structural remains inside Mint area. *See p. 27*



A

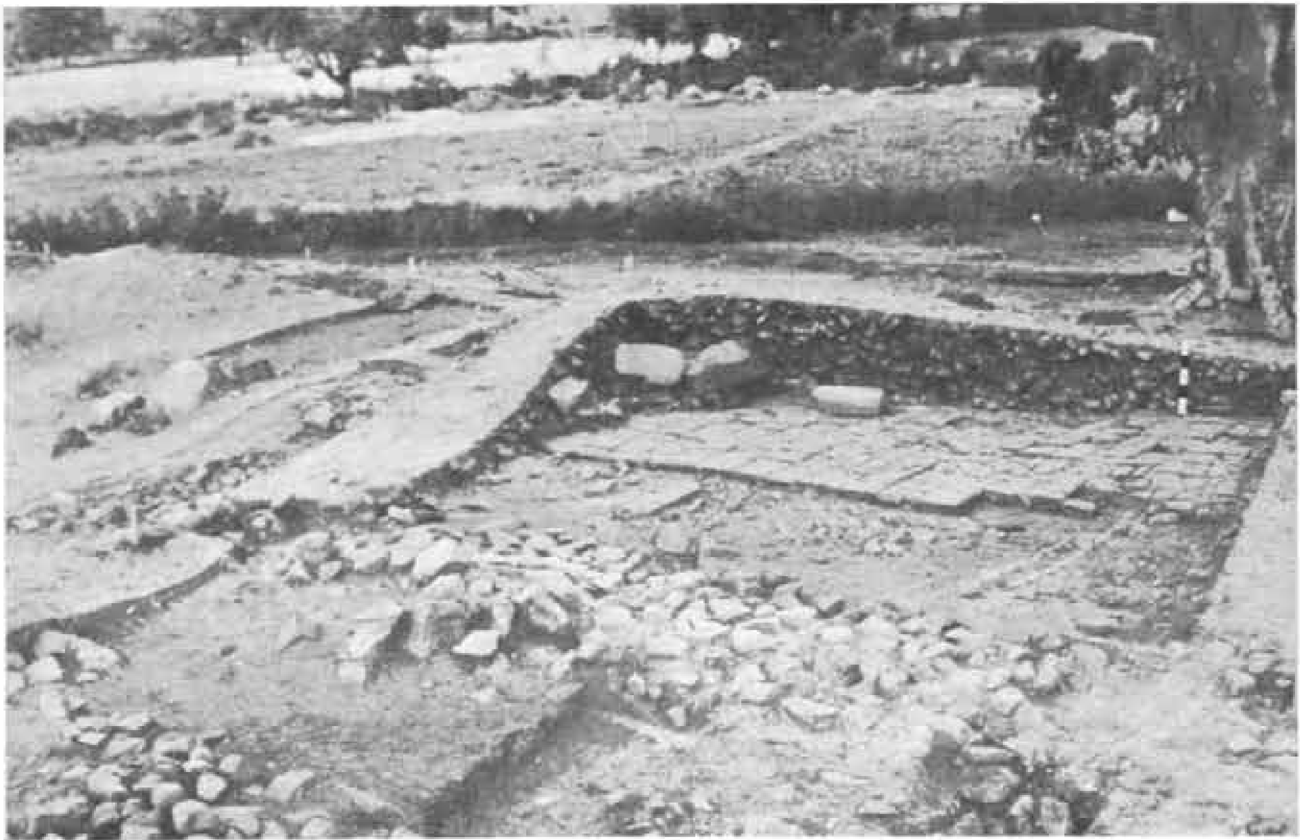


B

Komaranahalli : A, *cist-circle*; B, *exposed skeletal remains*. *See p.* 29



A



B

Khajuraho: A, *general view*; B, *excavated burnt-brick platform*. *See p. 32*

A



B

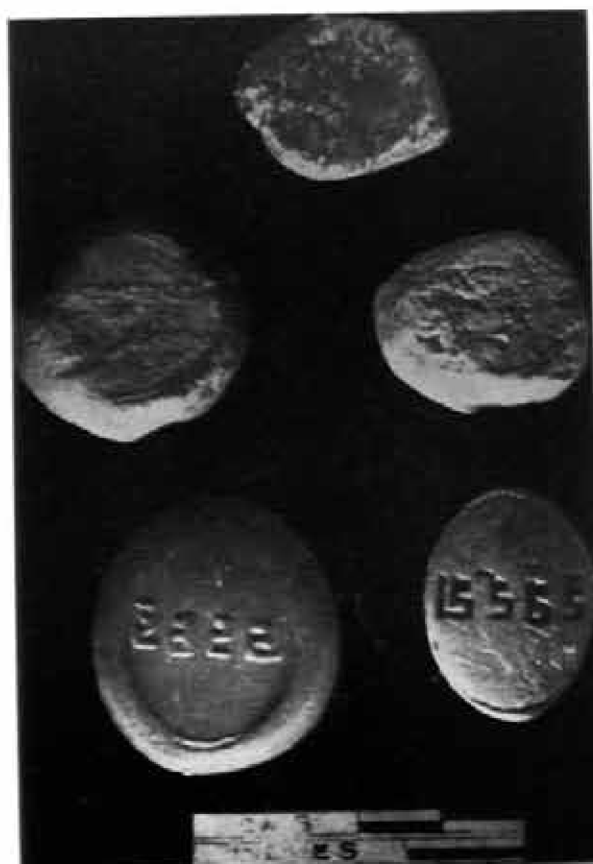
Bhimbetka: A, *Brahmi inscription on rock-painting*; B, *patintings in black on white paintings.* *See p. 36*



A

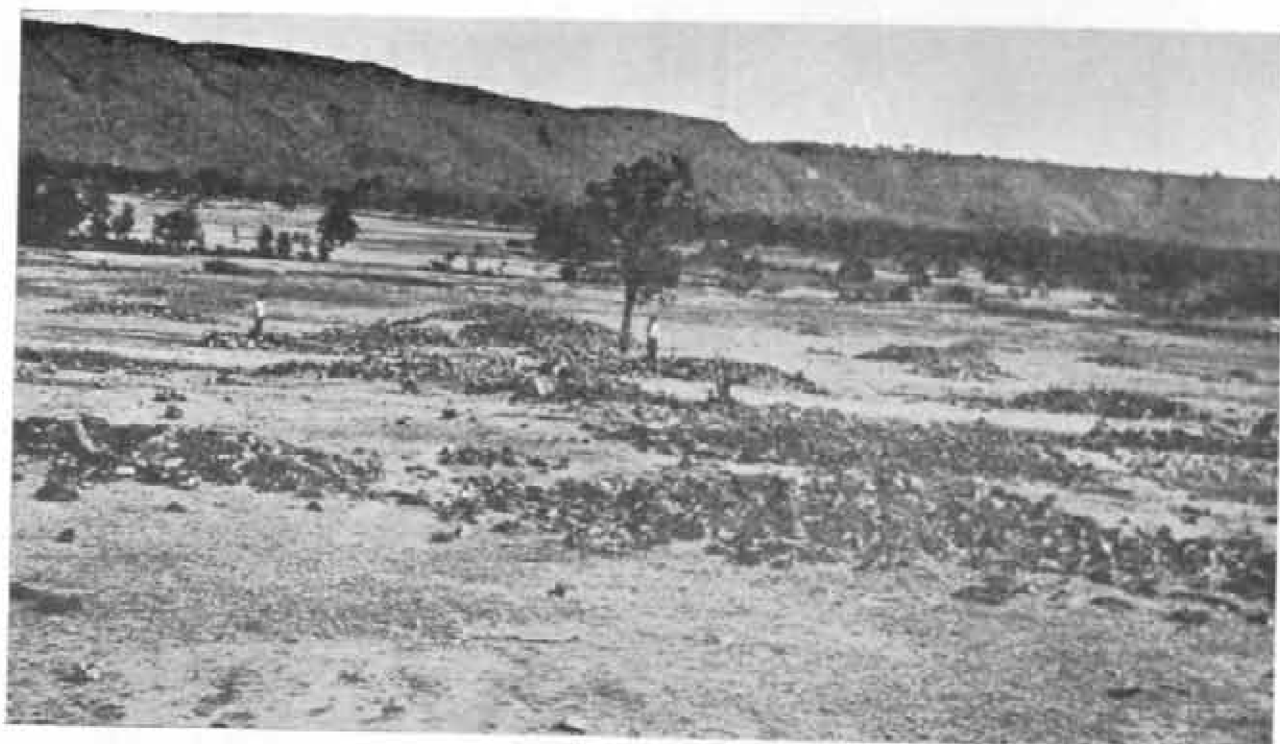


B



C

Nandur: A, *excavated structures*; B, *view of brick well with exposed section*; C, *seals and sealings*. *See p. 37*

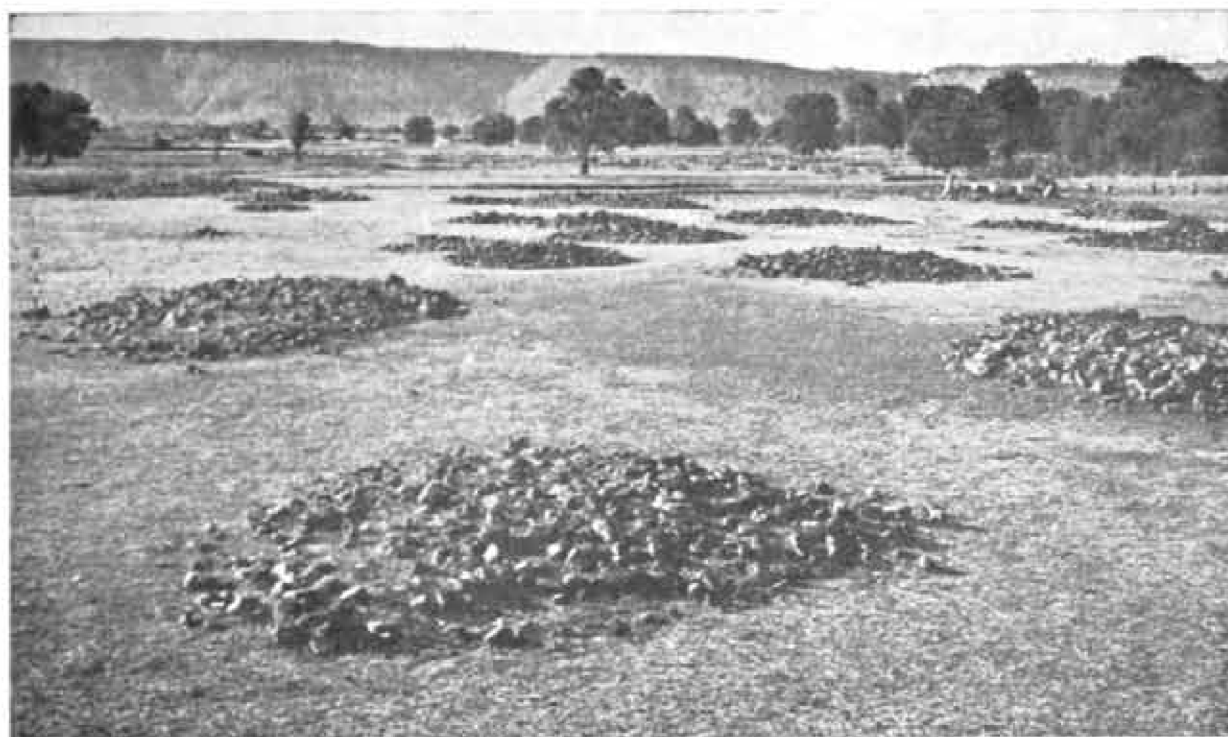


A



B

Amhata: A, *general view of Megalithic cluster;* B, *excavated Megalith.* *See p. 37*



A

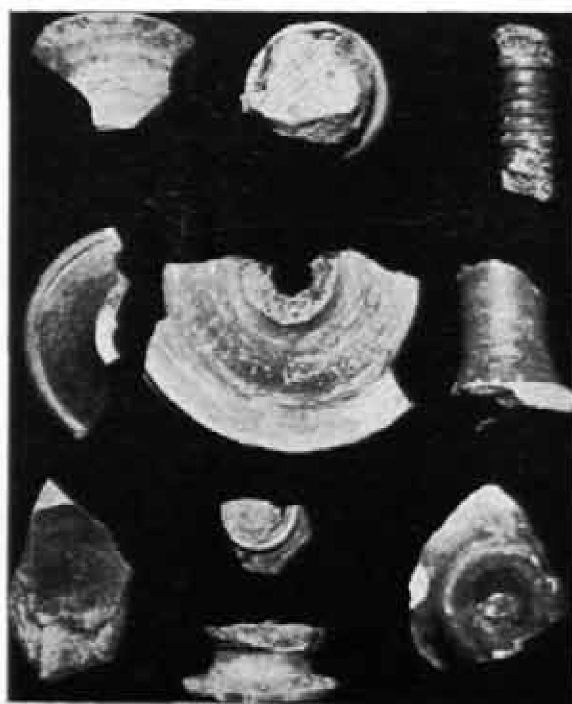


B

Munhai: A, *general view of Megalithic cluster*; B, *exposed Megalith*. *See p. 38*



A



B



C

Runija: Chalcolithic pottery. *See p. 39*



A



B

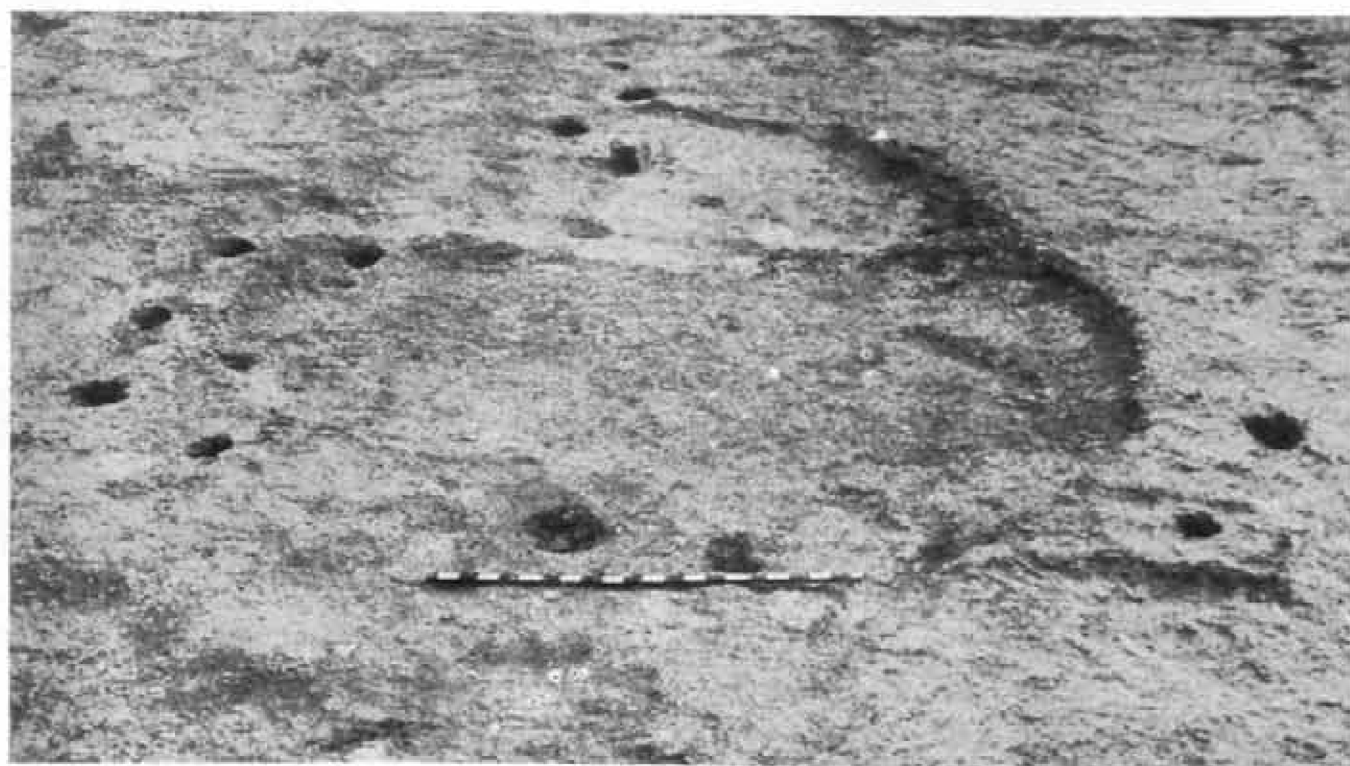


C

A, *Daulatabad: exposed tank and terracotta pipe*; B, *Boregaon: stone trough*; *and* C, *iron objects from Megalith* 35. *See p.* 40



A



B

Inamgaon: A, *double-burial*; B, *house-plan with post-holes*. *See p. 41*

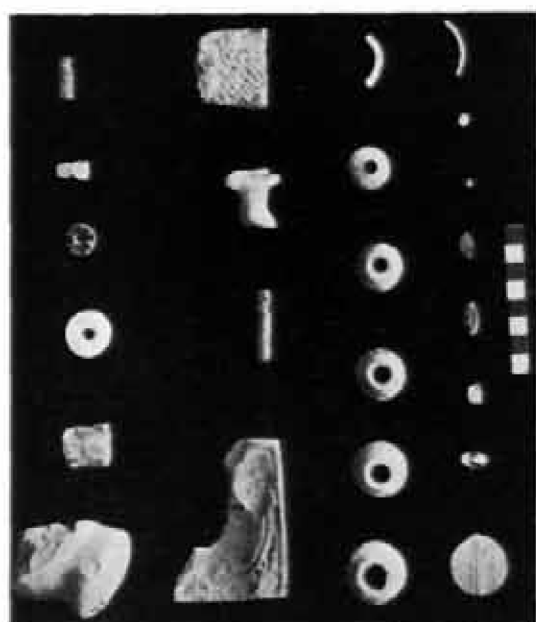


A

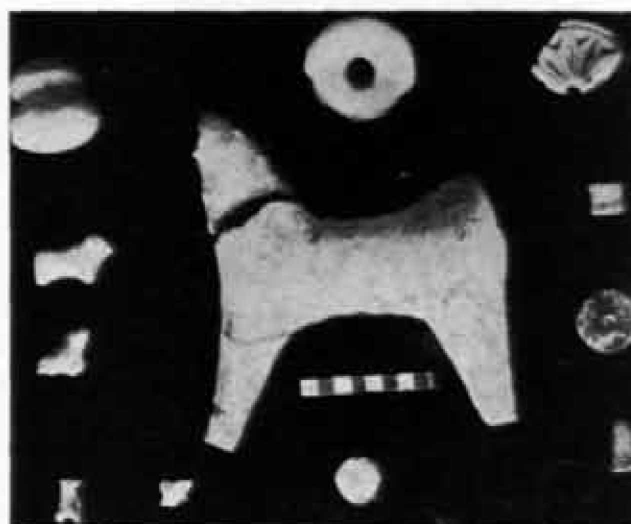


B

Inamgaon: A, *excavated house-plan*; B, *child burials*. *See p. 41*



A



B

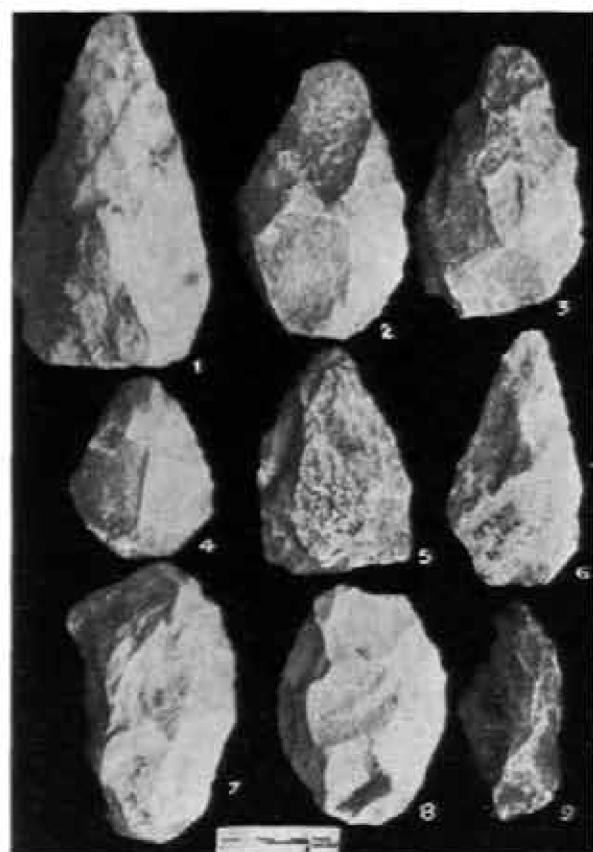


C

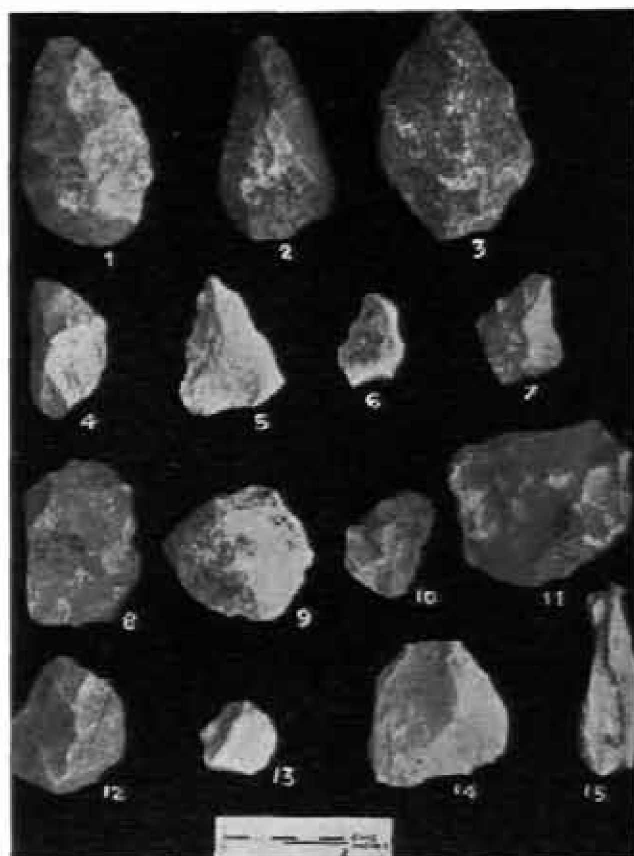


D

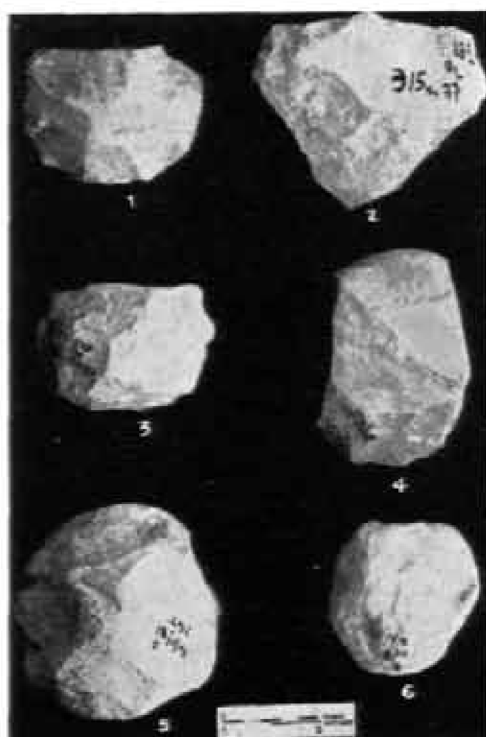
Singh Bhagwanpur: A, *miscellaneous objects, Period I*; B, *terracotta*, C, *bone objects*; *and* D, *pottery stamps*. *See p. 51*



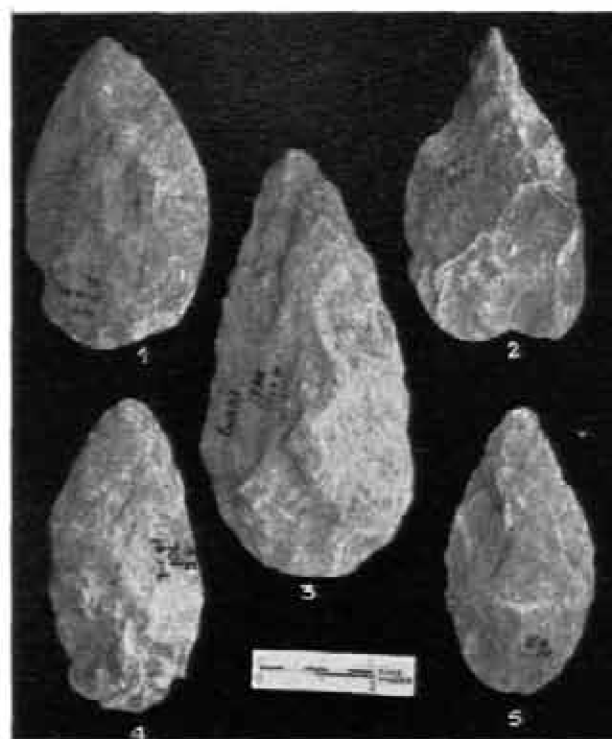
A



B

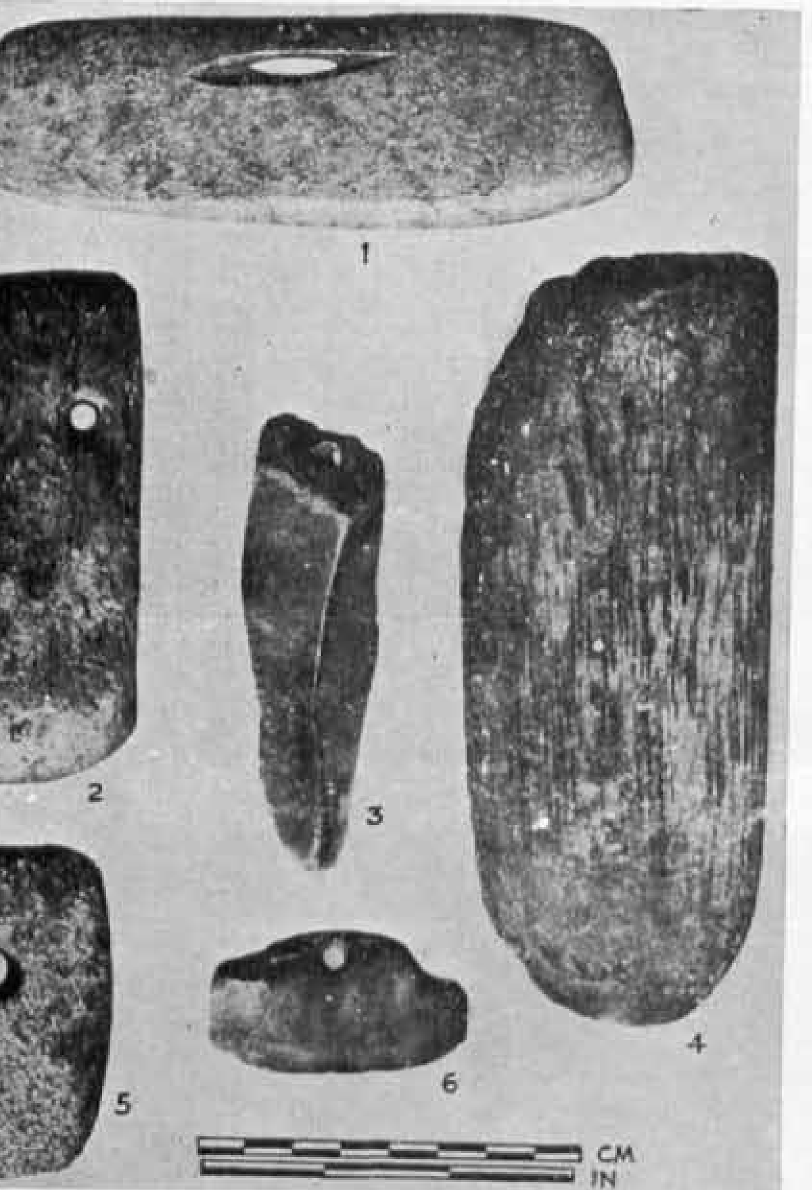


C

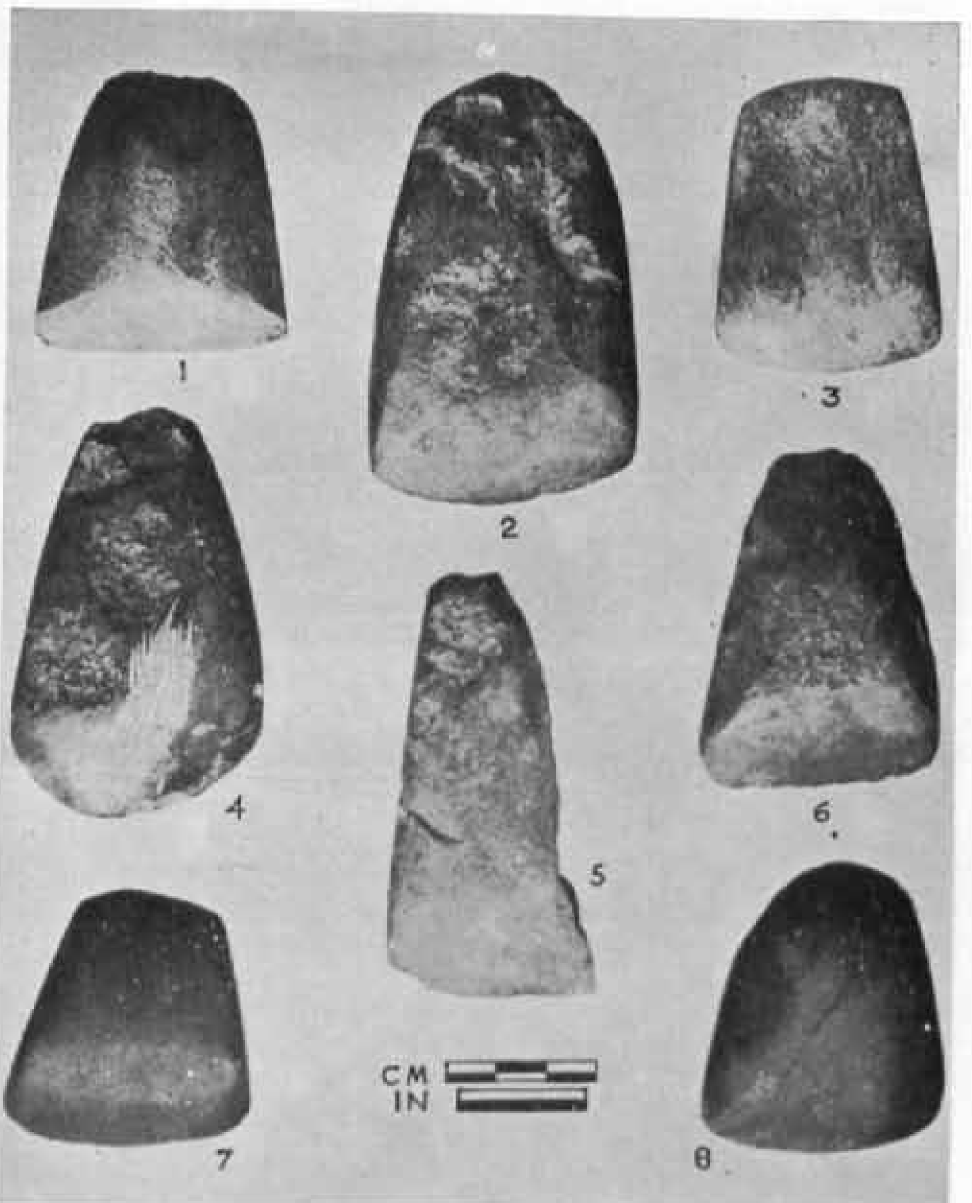


D

A *and* C, *Singi Talav: Early Acheulian*; B, *Didwana: Middle Palaeolithic and* D, *Jankipura: Late Acheulian tools.* *See pp. 57 and 59*

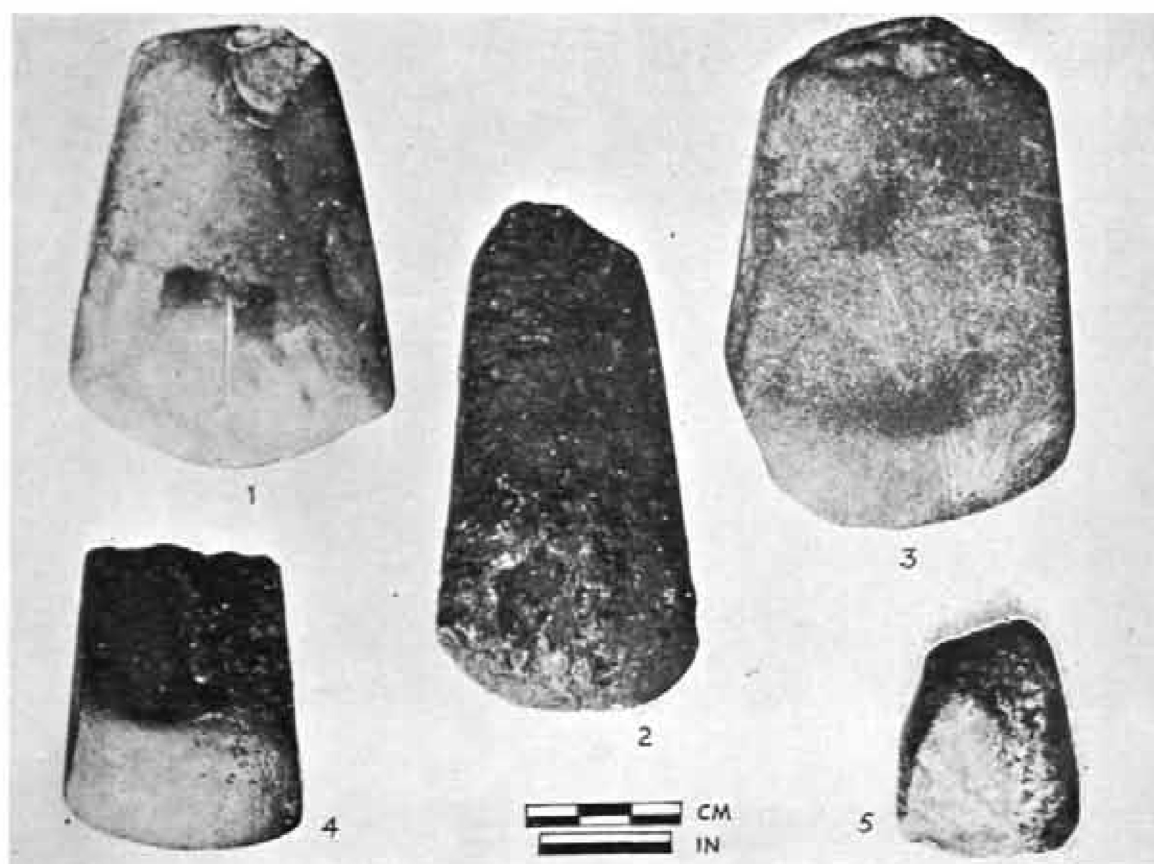


A

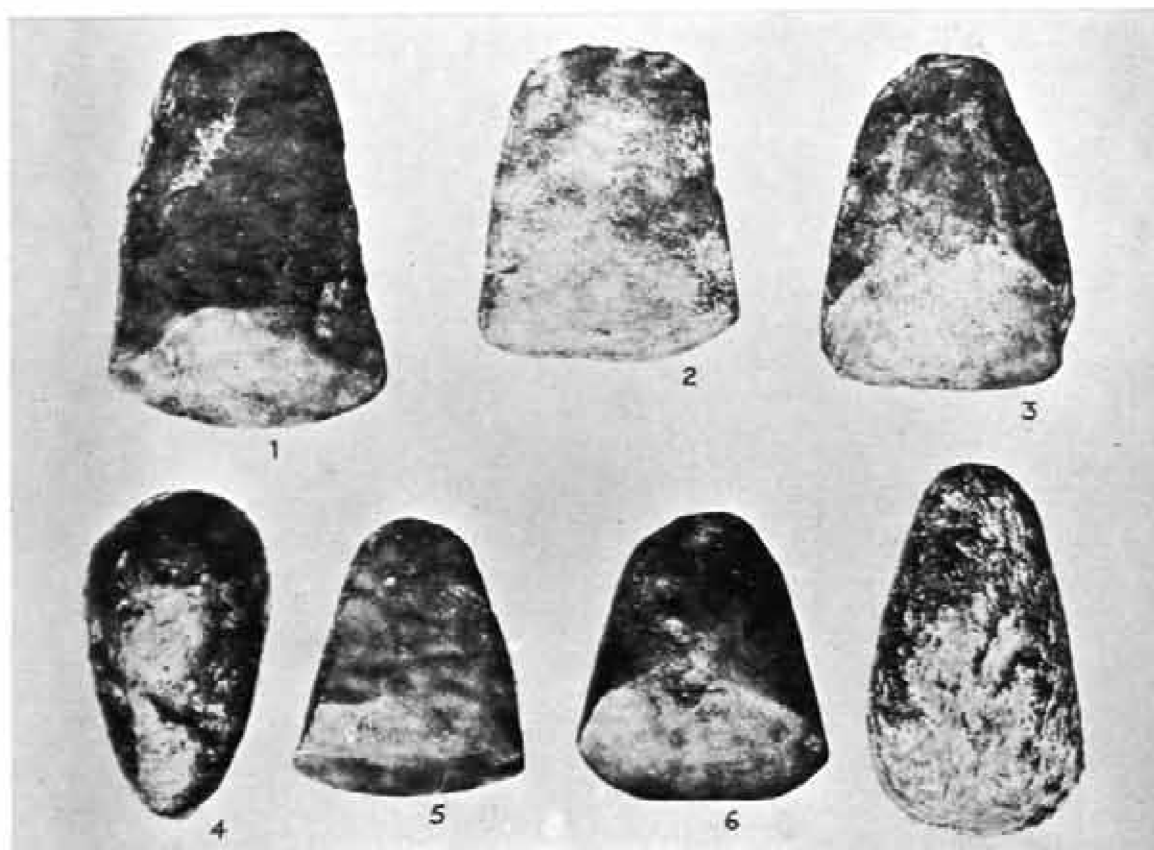


B

North Sikkim: Neolithic tools. *See p. 63*



A



B



A

B



A



B

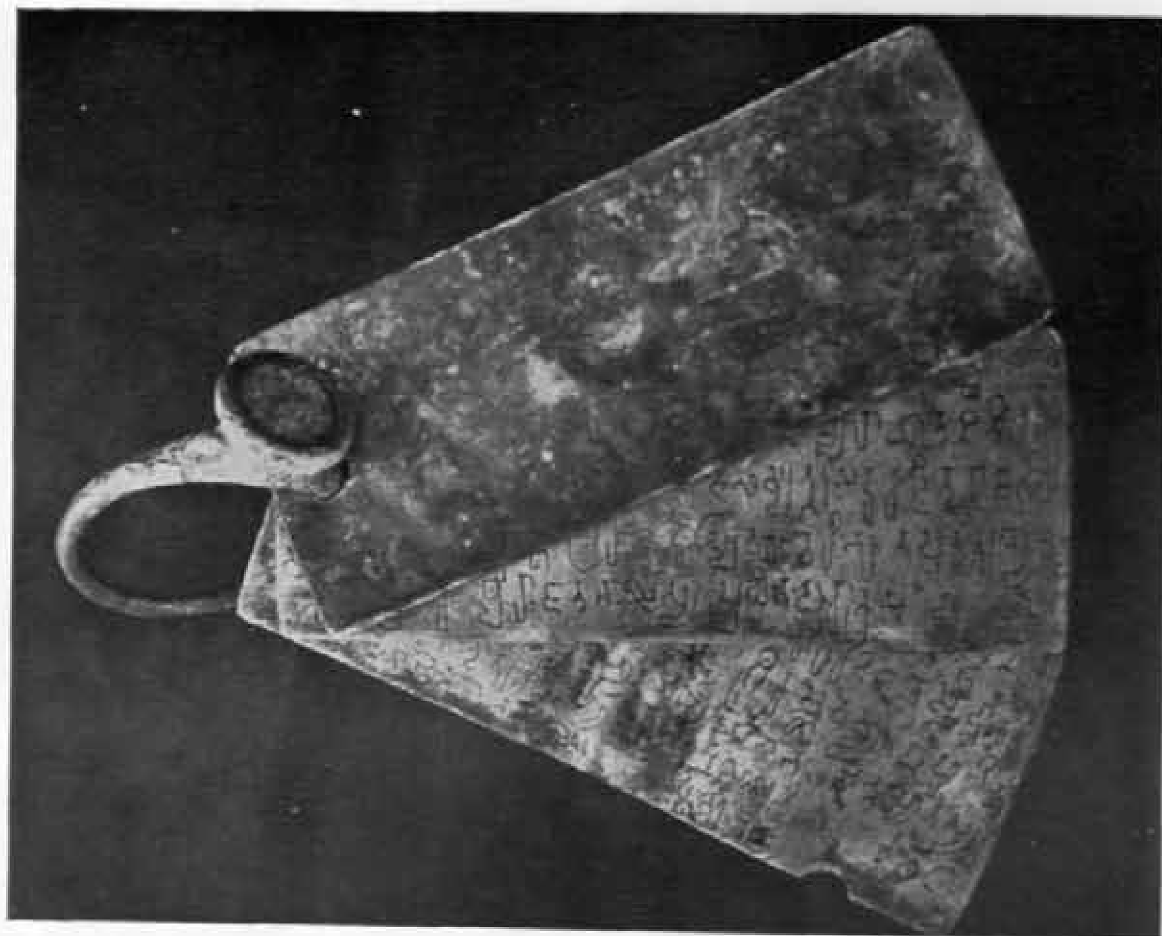


C

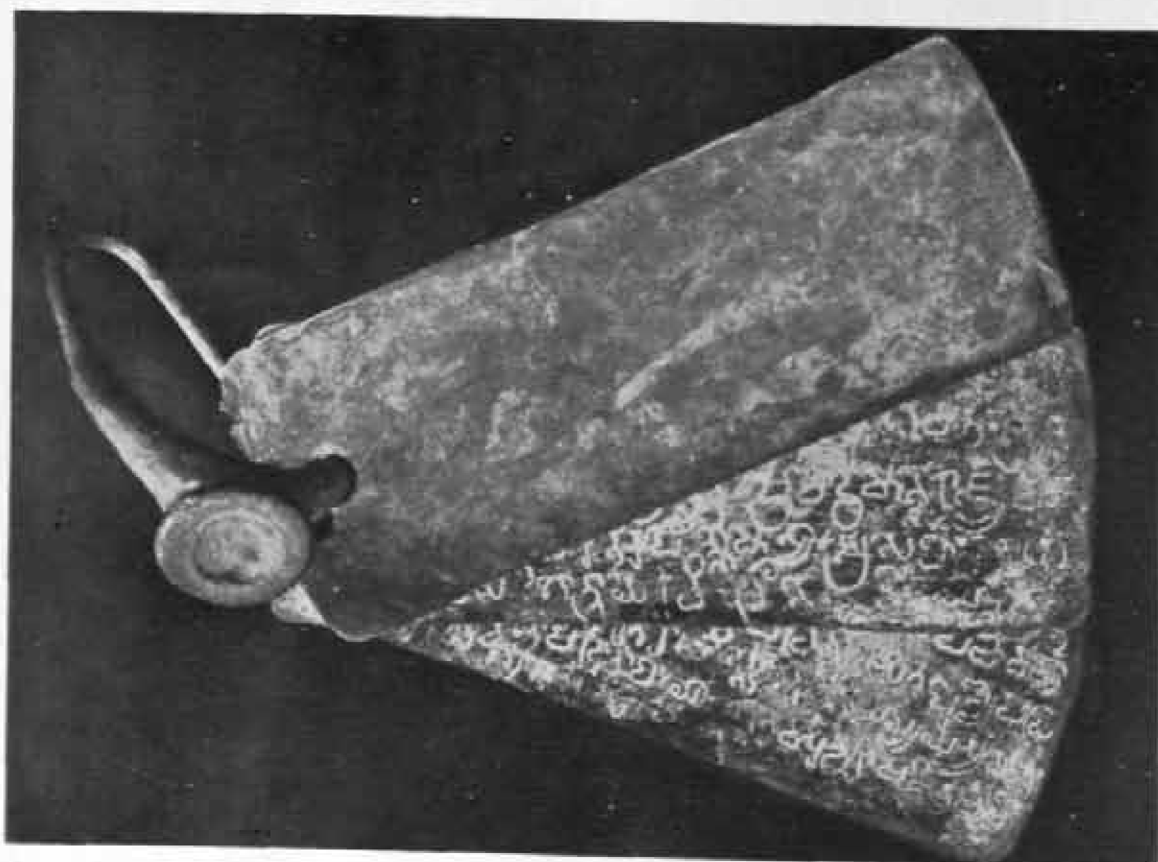


D

Hulas, terracotta objects: A, *sealing*, B, *animal figurine*, C, *spindle-whorl*, *and* D, *indeterminate object*. *See p. 76*

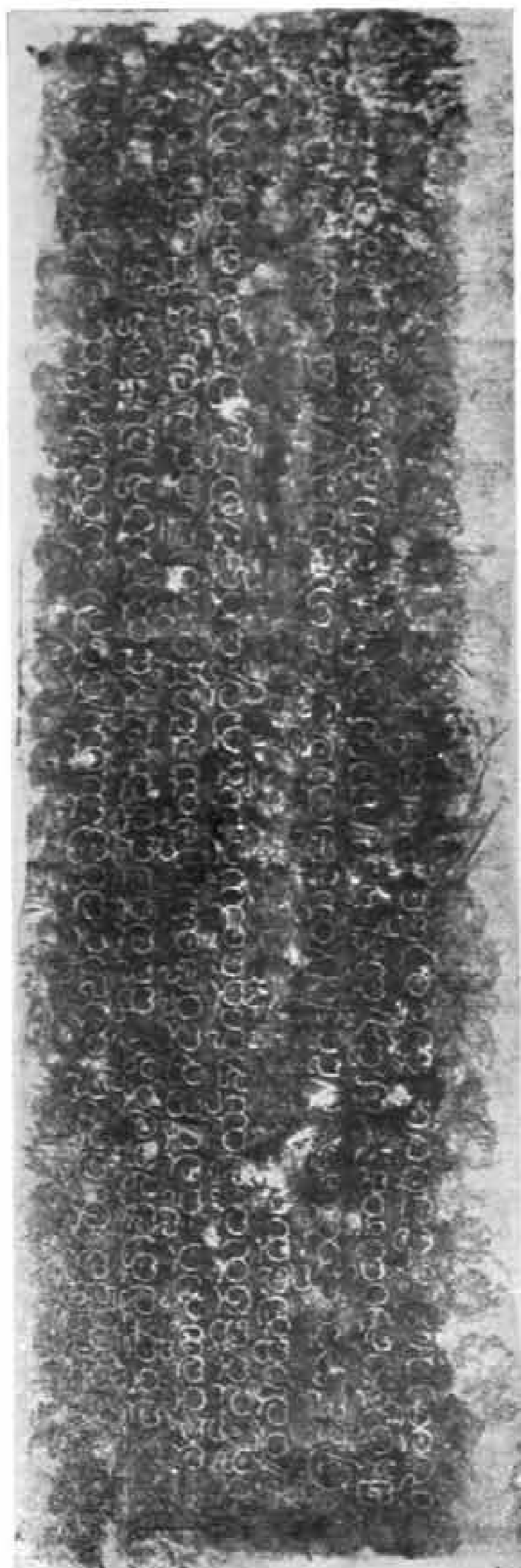


B

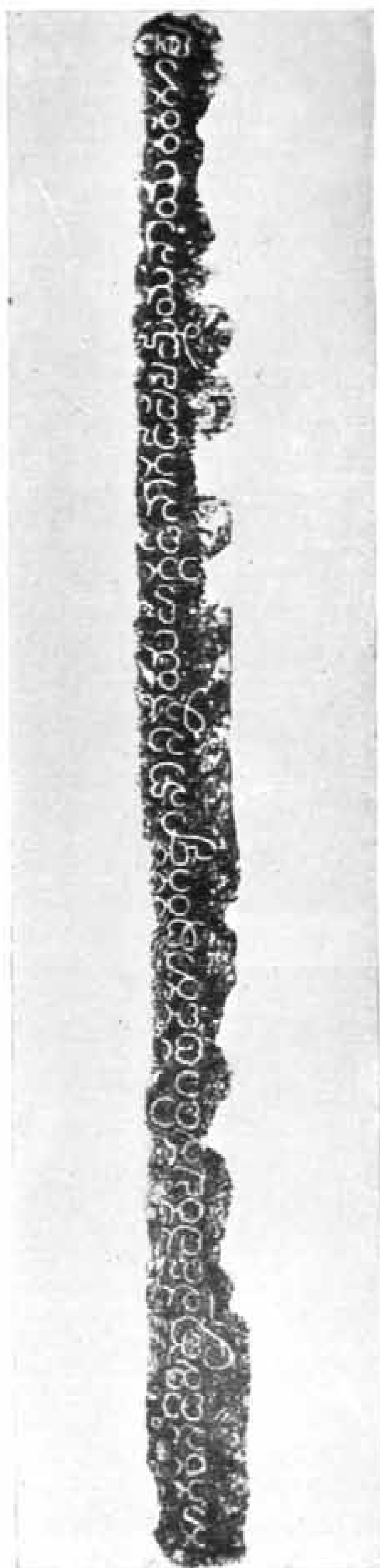


A

Shivalli: copper-plate inscription. *See p. 80*



A



B

Jinanathapura: inscriptions from Santinatha-basadi. *See p. 80*



A



B



C

A, *Sidhpur: head of Siva;* B and C; *Vadodara: metal image of Vishnu.* *See p. 90*



A



B

A, *Tramban*: *Megaliths*; B, *Lonad*: *caves before clearance*. *See pp. 90 and 92*



1



2



3



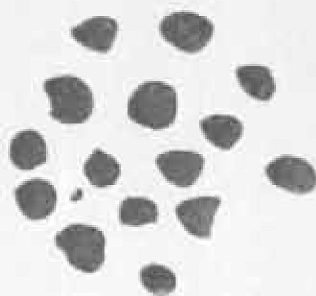
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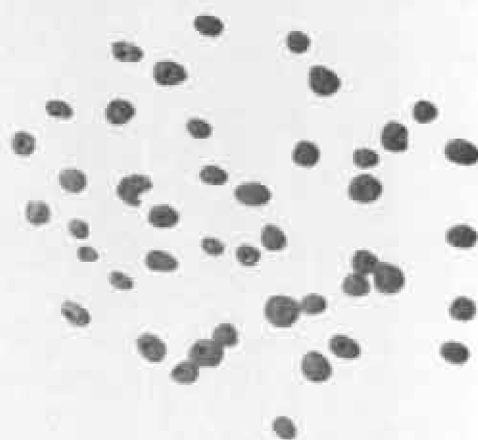
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6

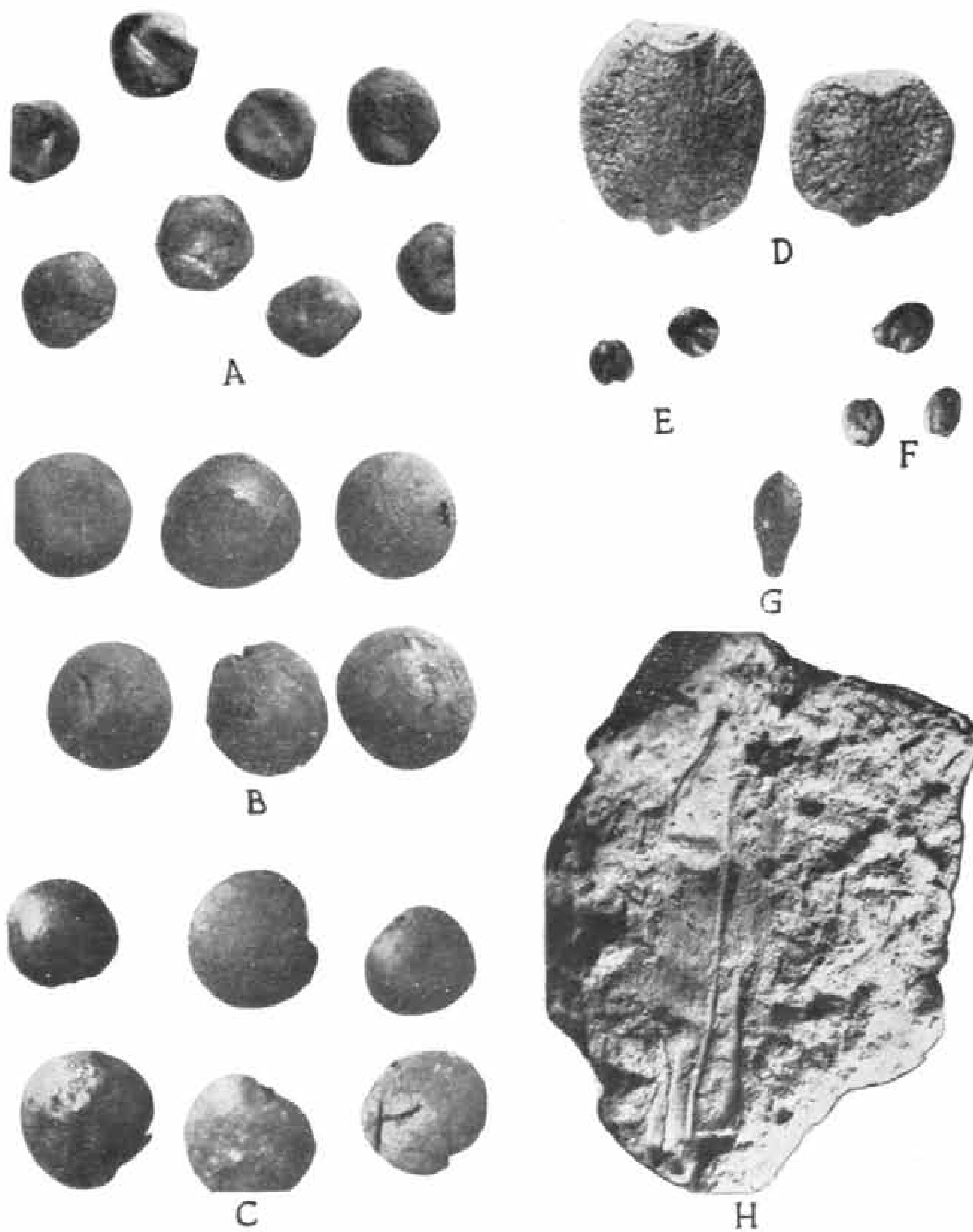


7



8

Semthan: plant remains. *See p. 107*



Daimabad: plant remains. *See p. 108*



A



B

A, *Dhamnar*: *Dharmaratha temple*; B, *Sesai*: *Sun temple*. *See pp. 118-19*



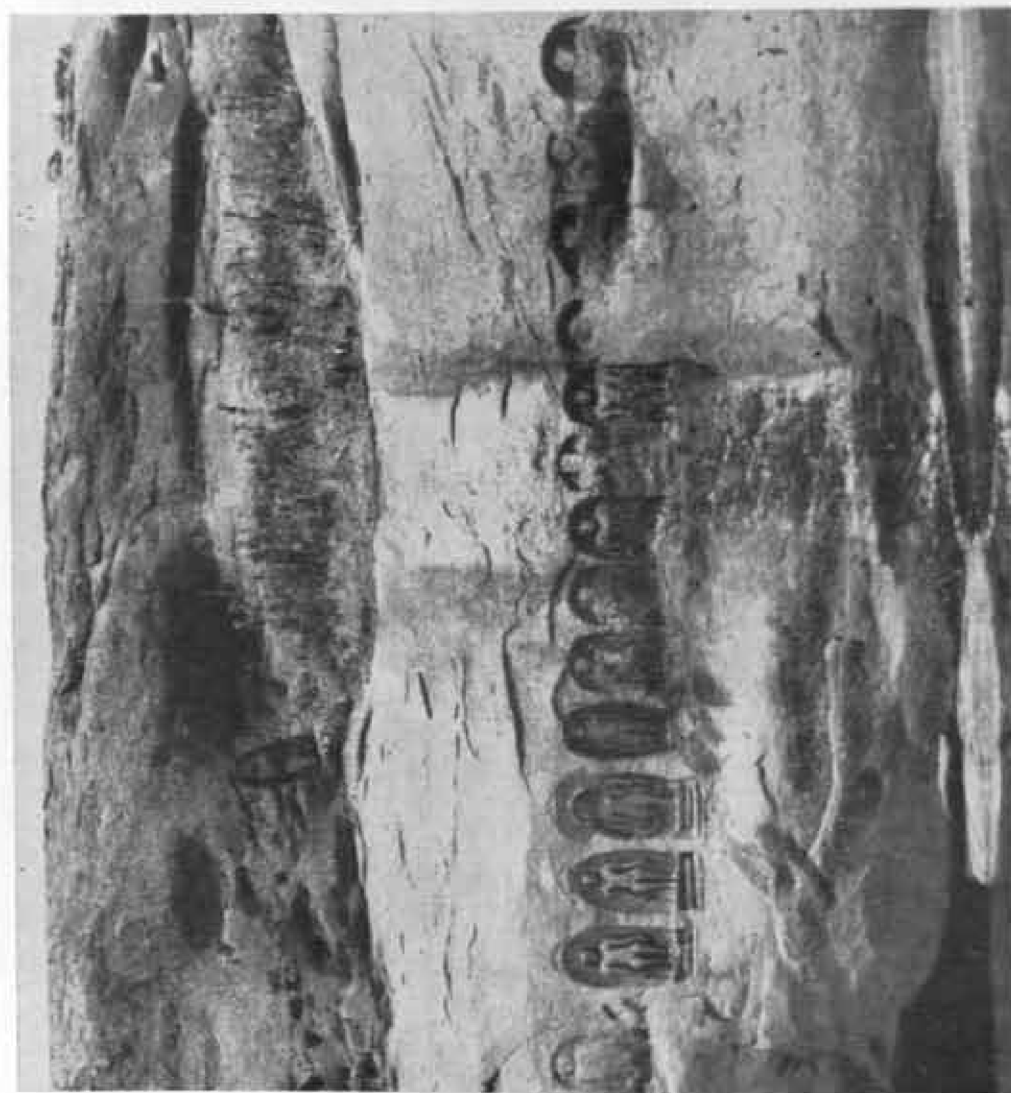


A B

A, *Tumain; door-frame, early medieval*; B, *Kukarramath: Ranamuktesvara temple.* *See pp. 118-19*



B



A

Tippuru: A, *bas-reliefs of Tirthankaras*; B, *seated Suparsvanatha*. *See p. 119*



Aralaguppe: navaranga ceiling of Kellesvara temple. *See p. 122*



A



B

Khajuraho. Lakshmana temple: A, before and B, after conservation. *See p. 124*



A



B

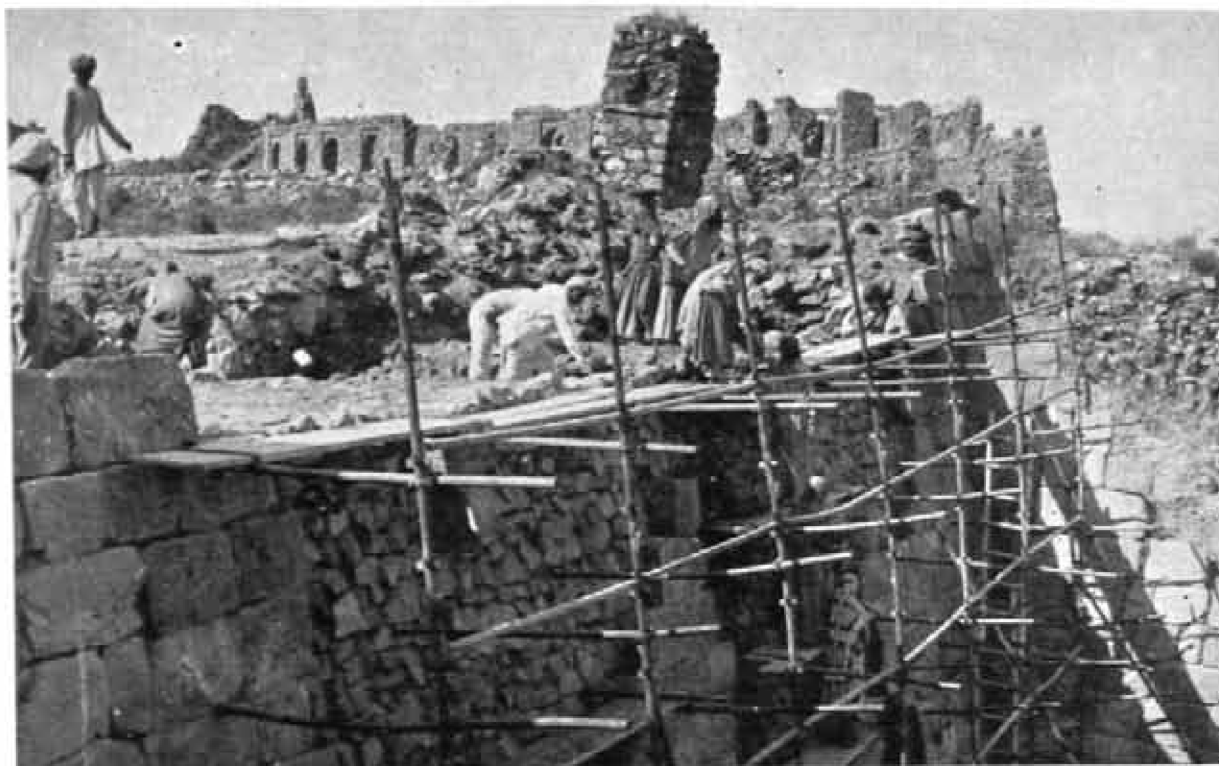
Gyaraspur, stupa: A, *before and* B, *after conservation.* *See p. 127*





A B

Delhi, Badekhan's chhatri: A, before and B, after conservation. *See p. 127*

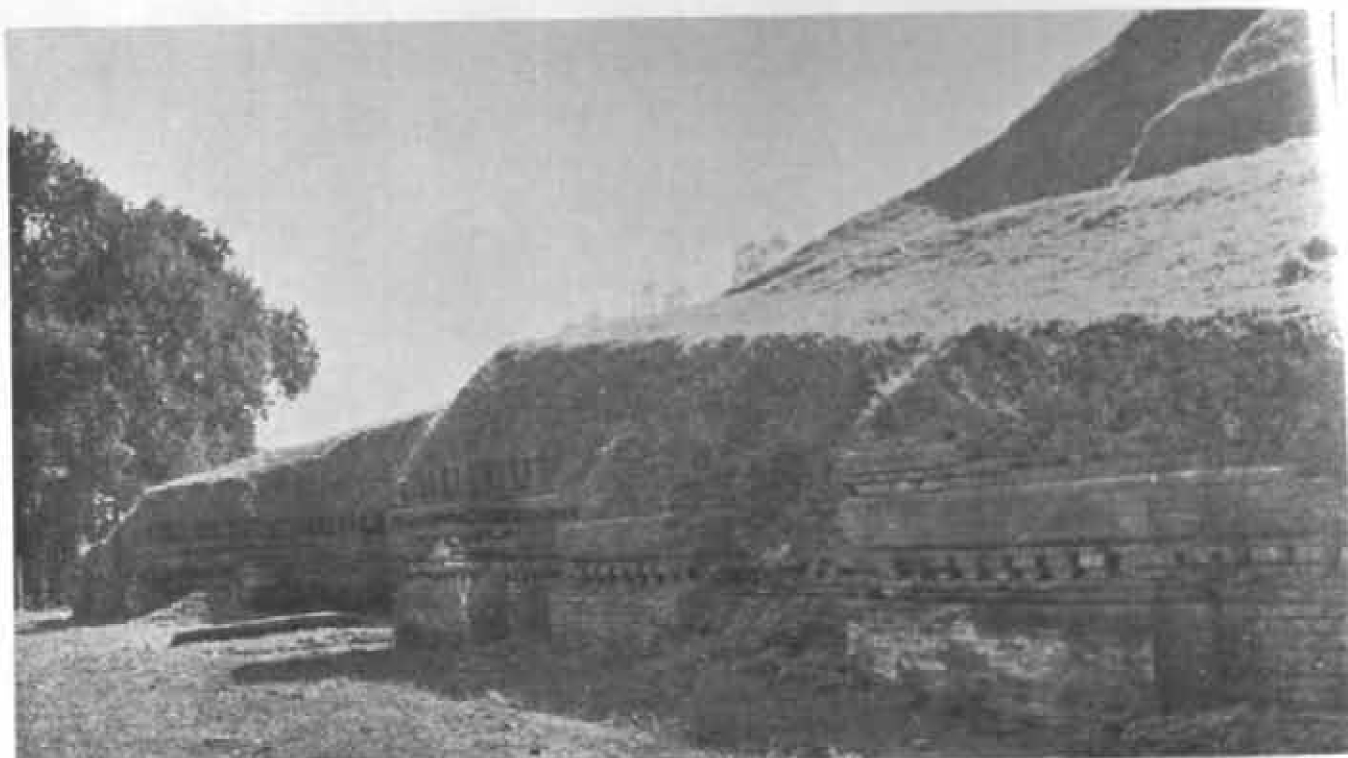


A



B

Adilabad, bastion : A, *before and* B, *after conservation.* *See p. 127*

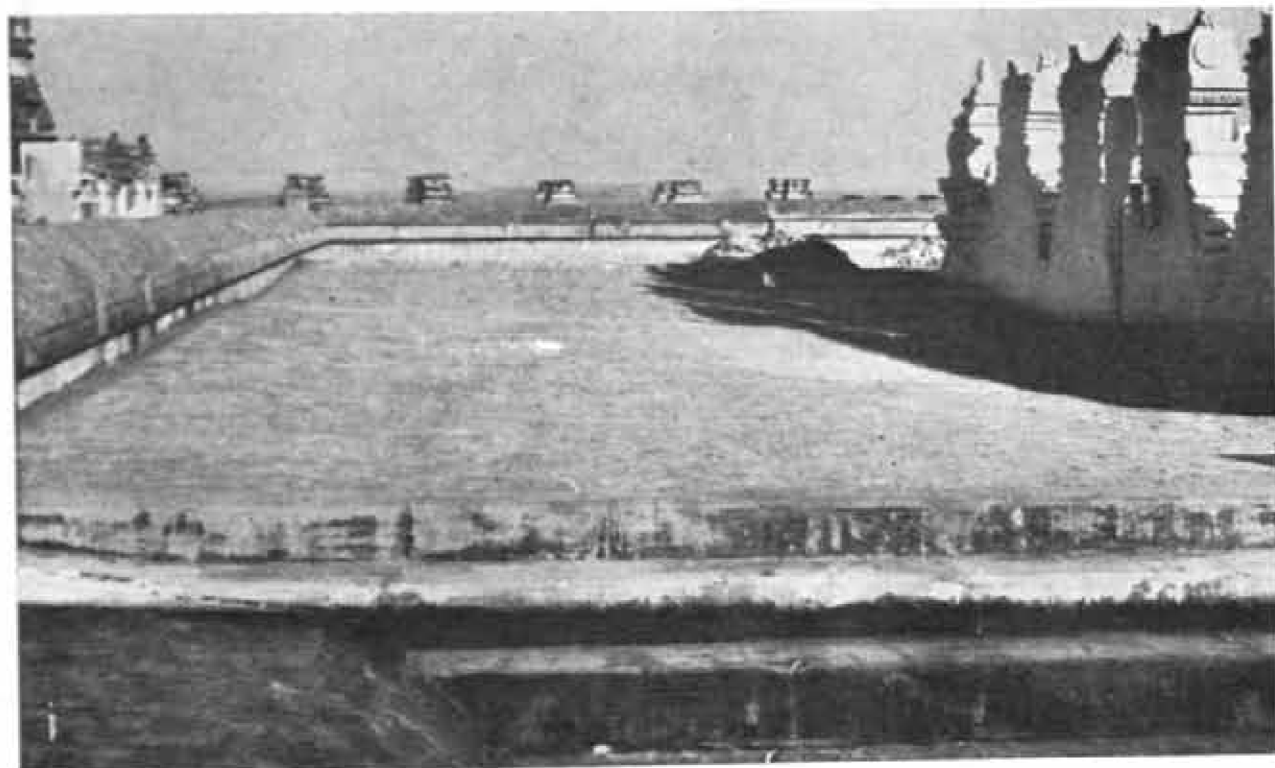


A

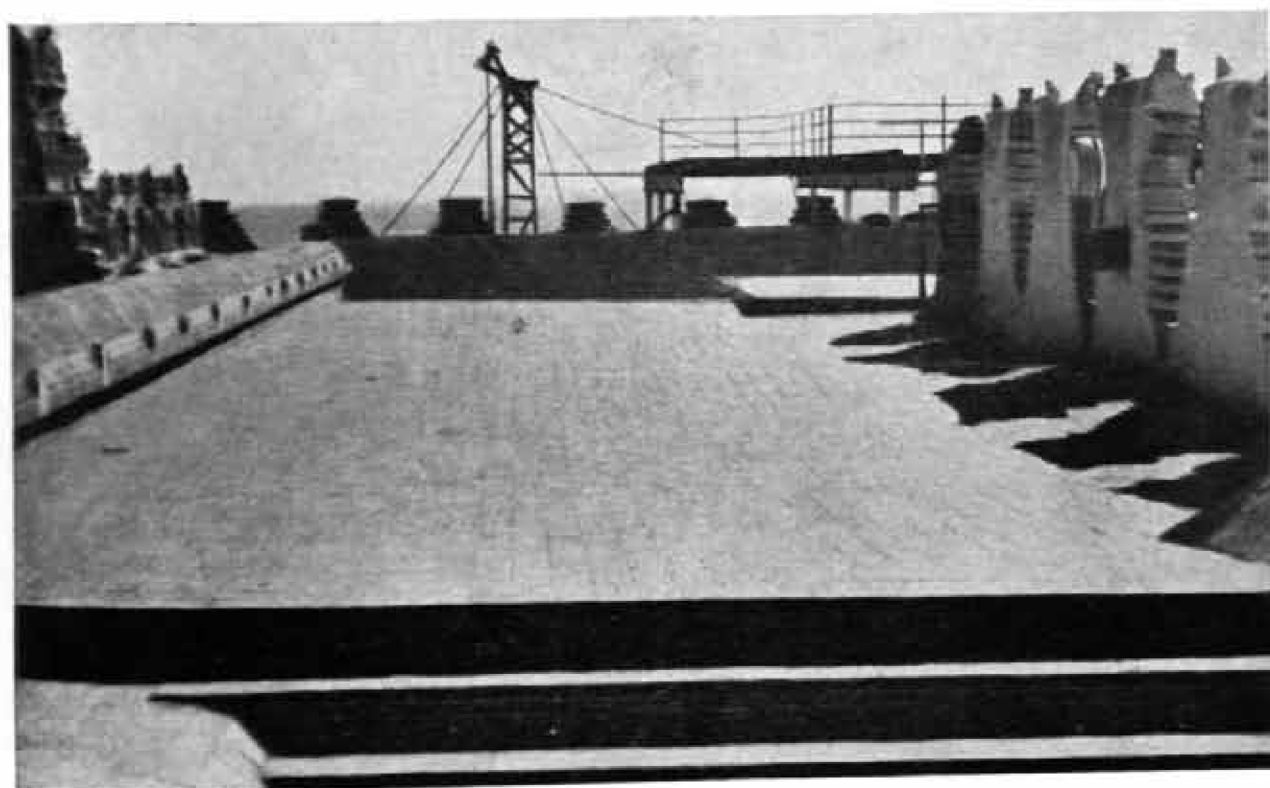


B

Nalanda, Temple no. 14: A, *before and* B, *after conservation of northern façade. See p. 130*



A

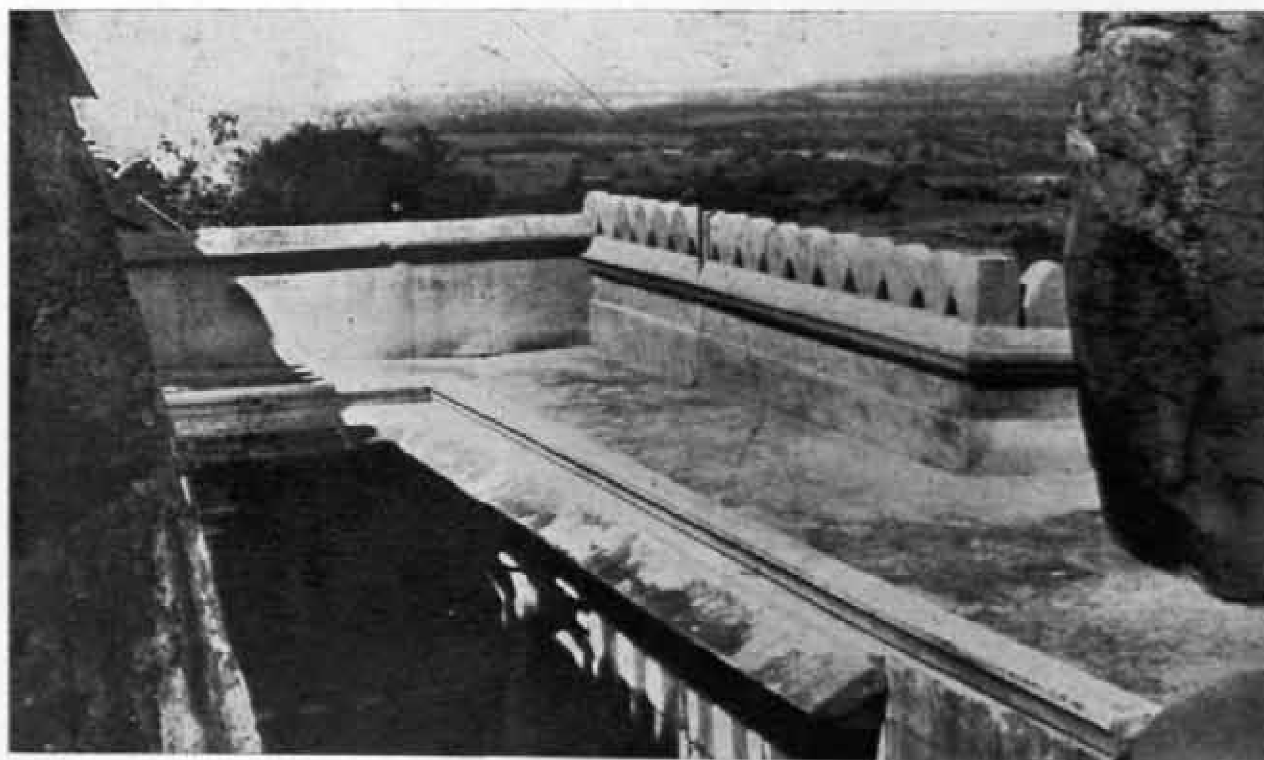


B

Sravanabelagola: A, *before and* B, *after conservation of terrace behind the Gomatesvara statue.* *See p. 134*

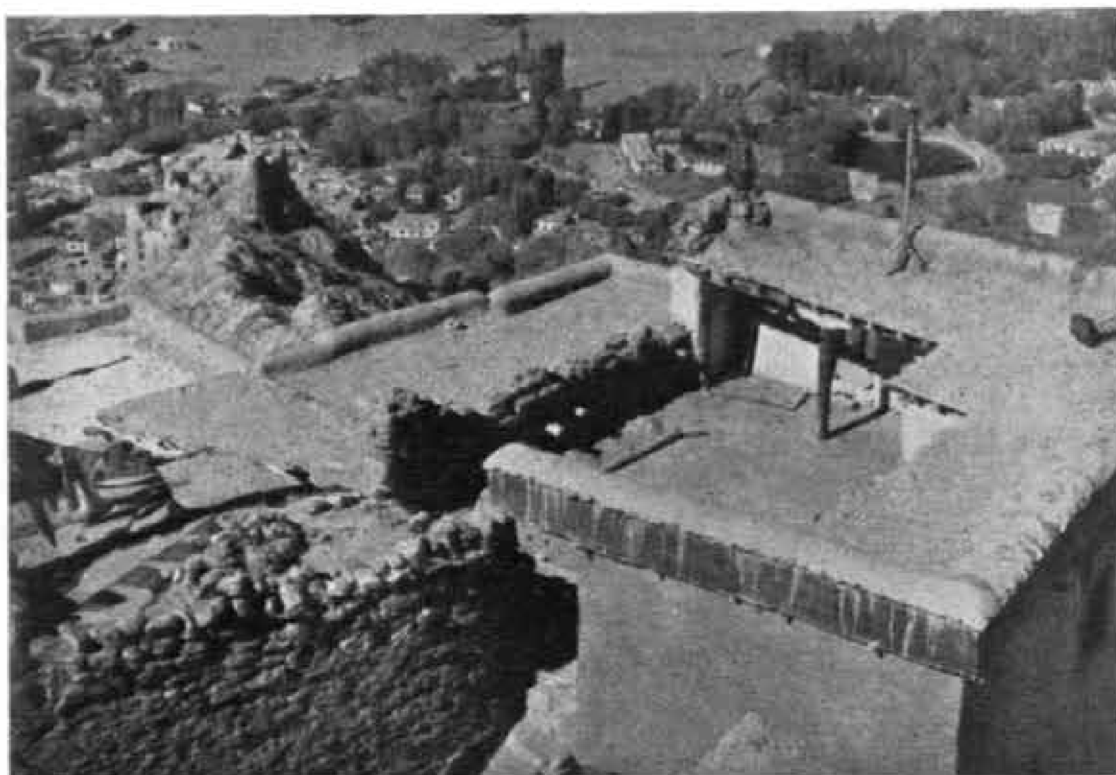


A

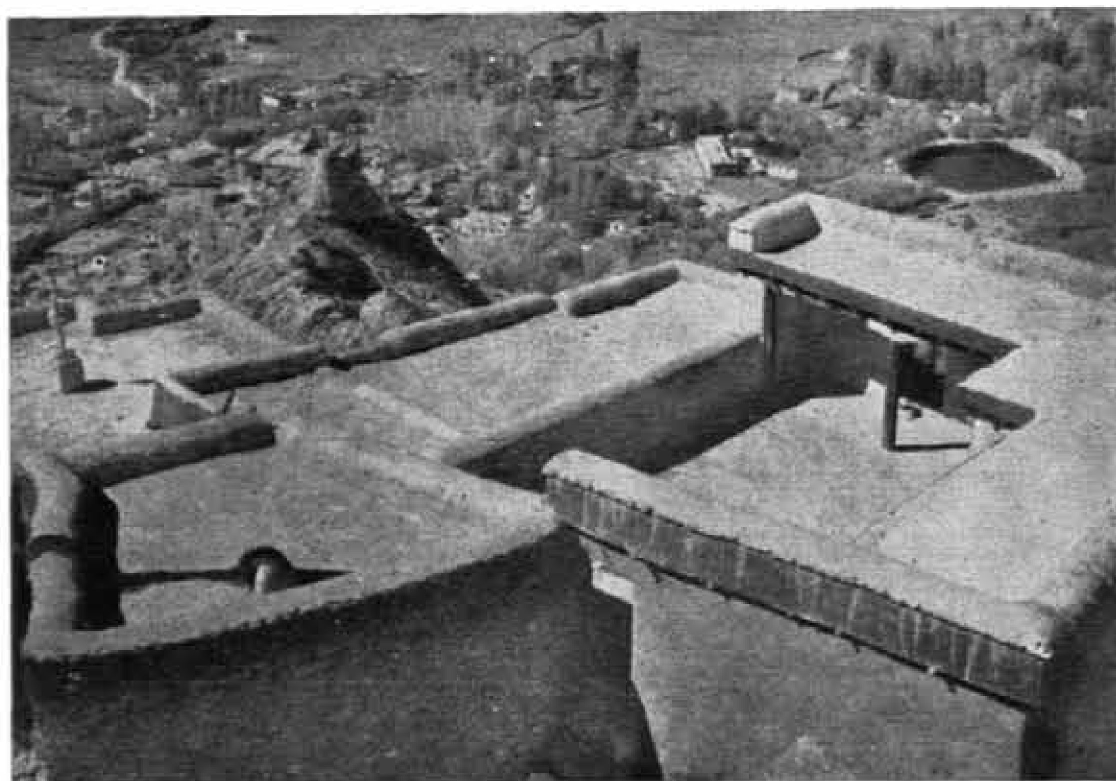


B

Sravanabelagola, Akhanda Bagilu: A, *before and* B, *after conservation.* *See p. 134*

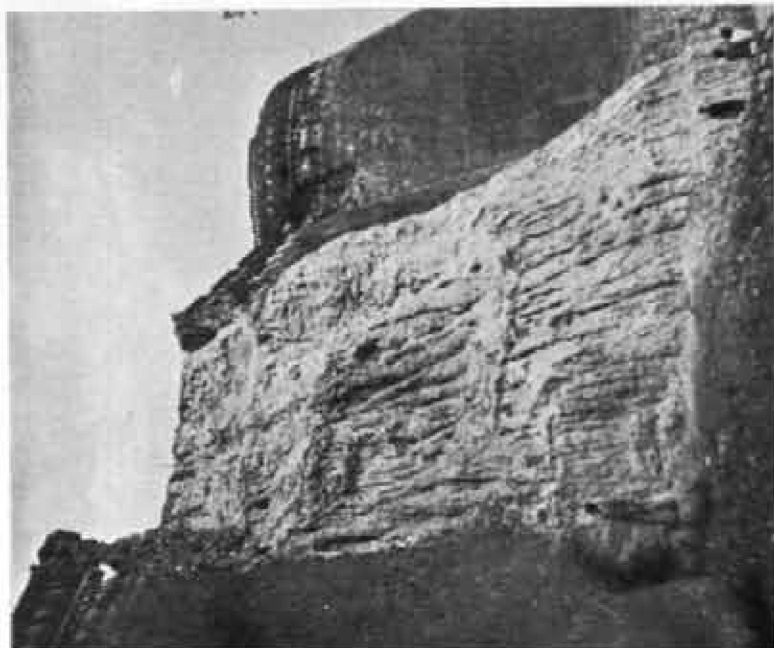


A

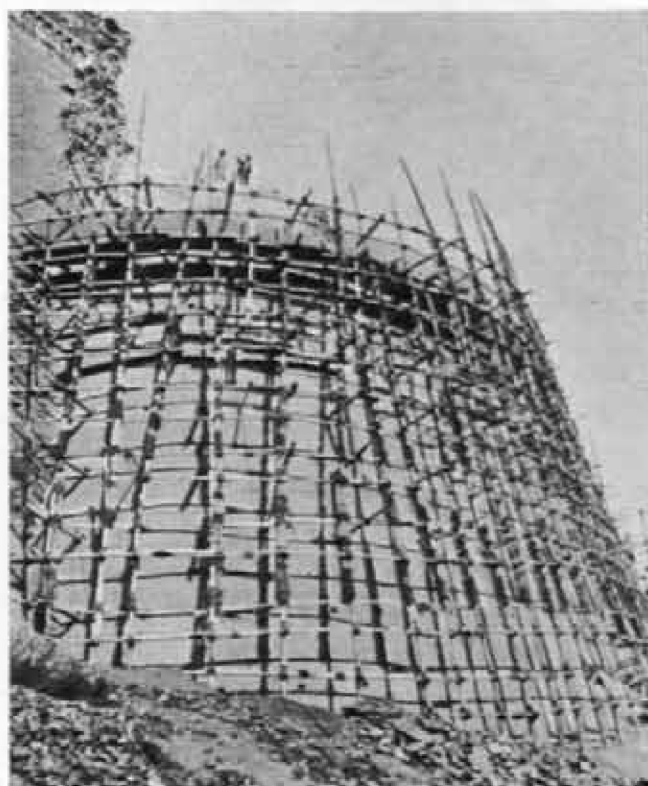


B

Leh, Gongkhong terrace: A, *before and* B, *after conservation*, *See p. 139*

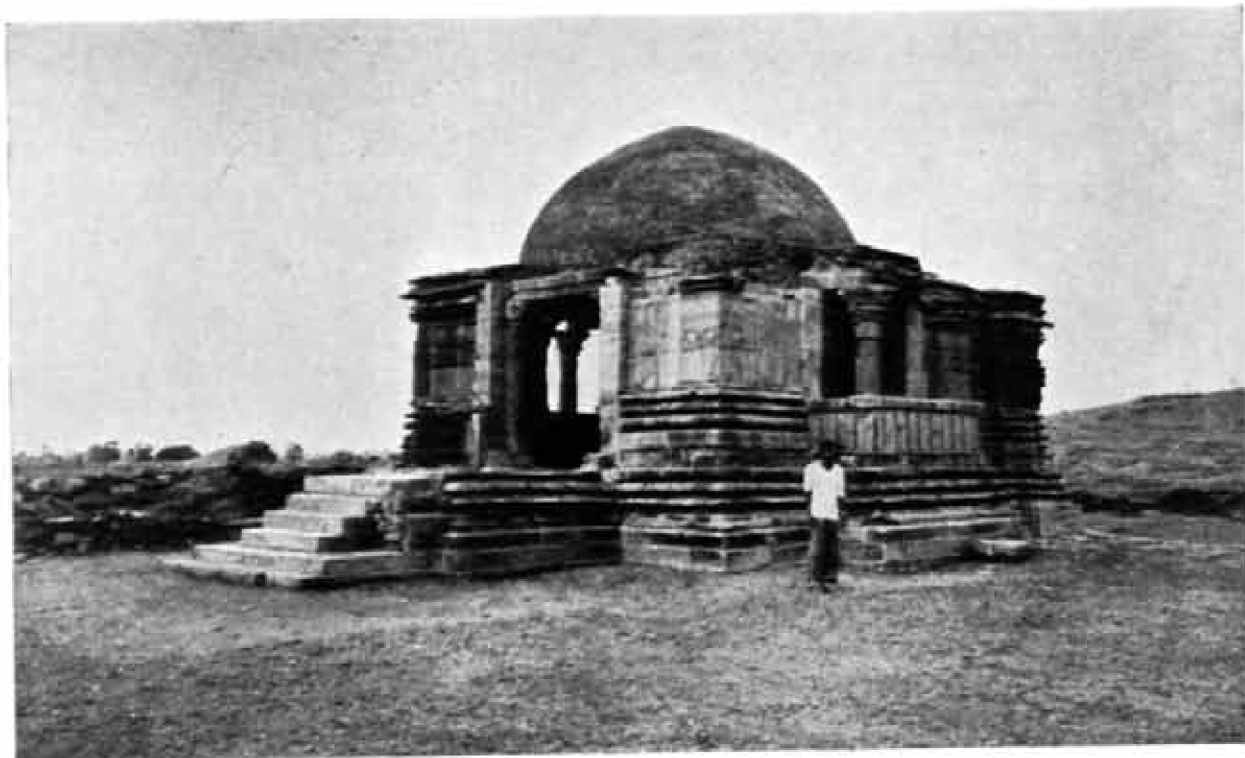


A



B

Bhatinda, fort: A, *before and* B, *during conservation*. *See p. 140*



A



B

Arthuna, Siva temple no. 2: A, *before and* B, *after conservation.* *See p. 147*



A



B

Arthuna, Nilakantha Mahadeva temple: A, *before and* B, *after conservation.* *See p. 148*



A



B

Kumbhalgarh, Golerao temple no. 6: A, *before and* B, *after conservation.* *See p. 148*



A

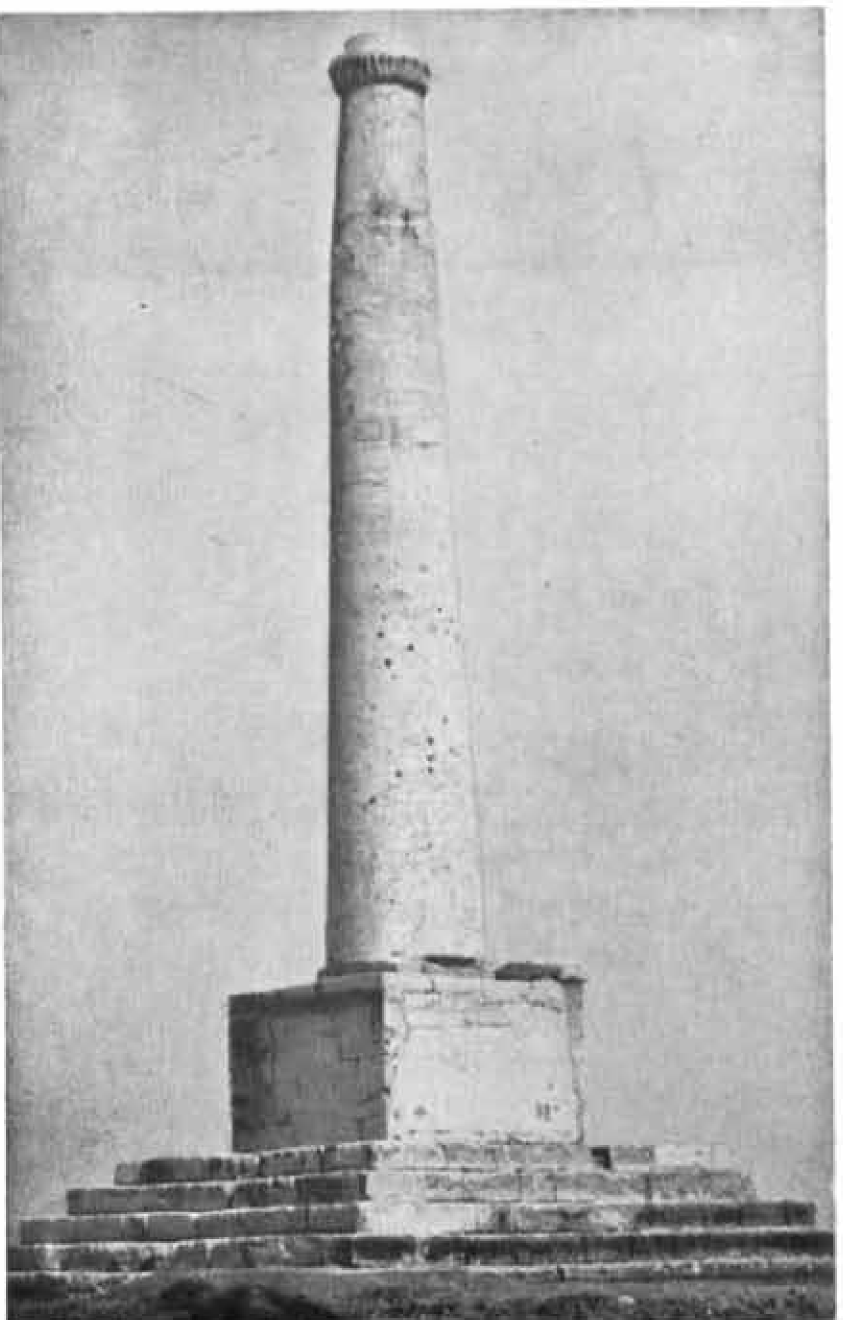


B

Arcot, masjid and pond: A, *flight of steps before and* B, *after conservation.* *See p. 142*



A



B

Macharda, Kirti-stambha: A, *before and* B, *after conservation.* *See p. 149*



A



B

Archaeological Museum, Velha Goa: A, painting before and B, after chemical treatment. *See p. 155*

